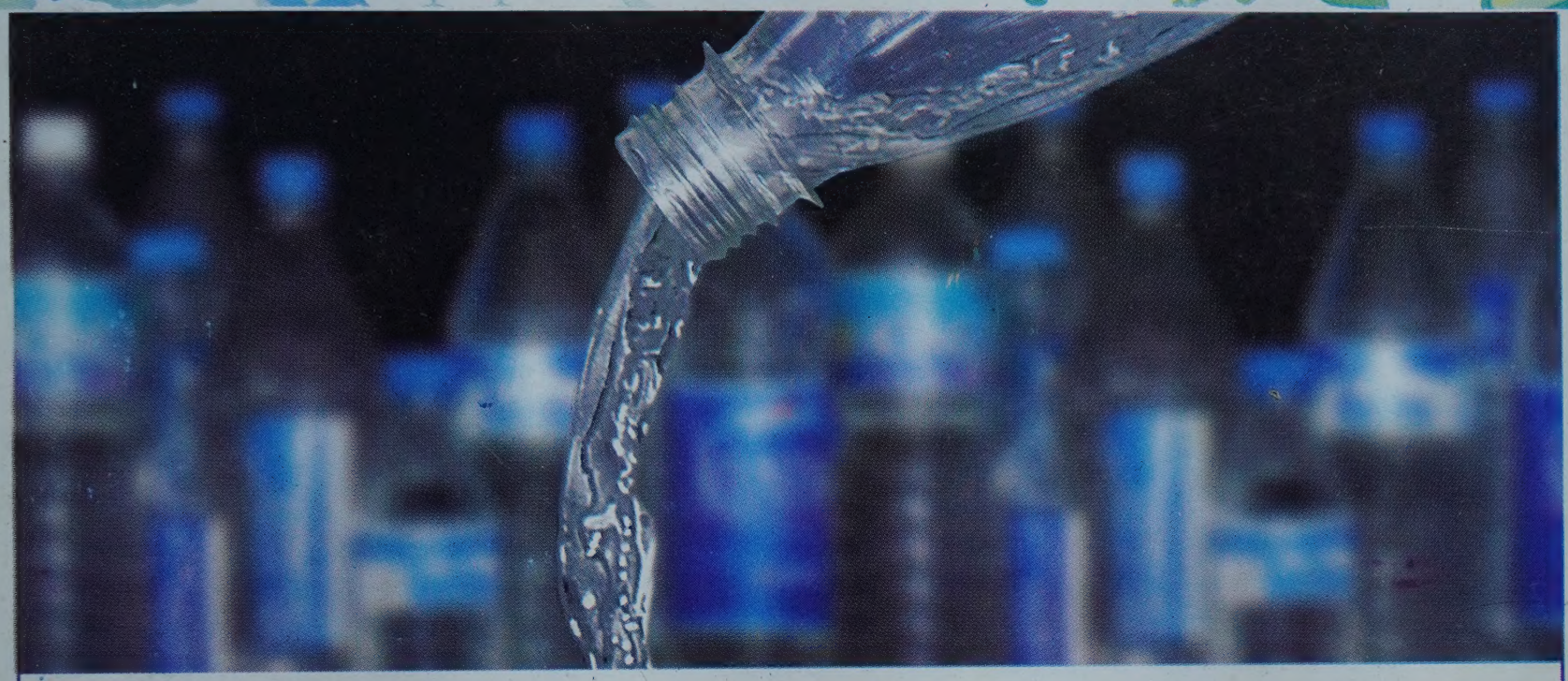
BEVERAGE & FOOD WORLD

DECEMBER 2001
Price : Rs. 40
Vol. 28 • No. 12
ISSN-0970-6194

REGISTERED WITH THE REGISTRAR OF NEWSPAPERS FOR INDIA UNDER No. RN 31862 / 77

REGD. NO. TECH- 47/1256/MBI/2001



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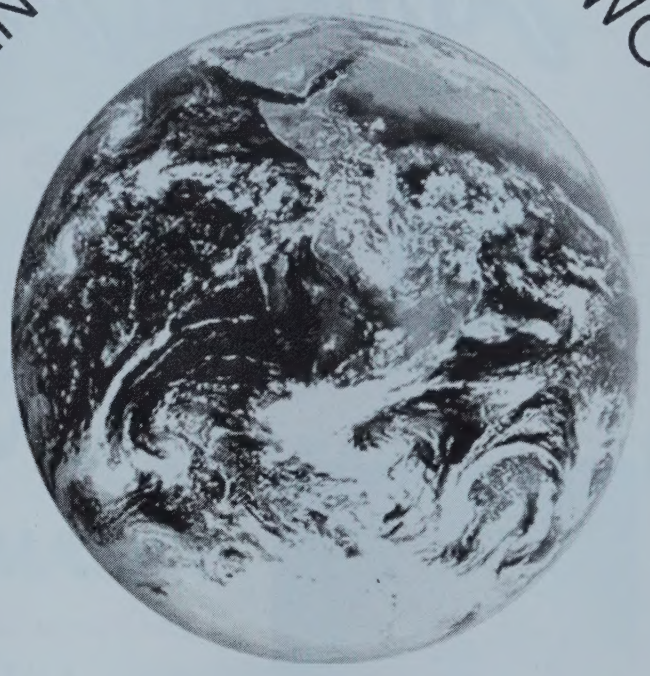

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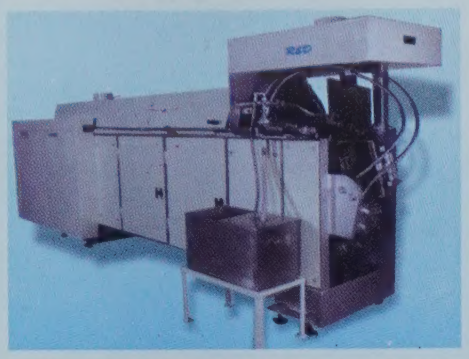

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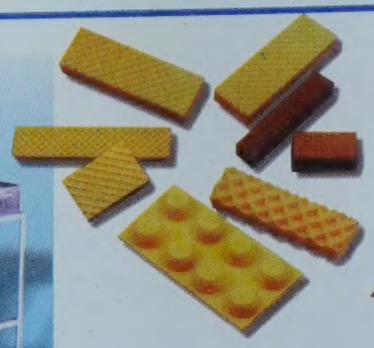

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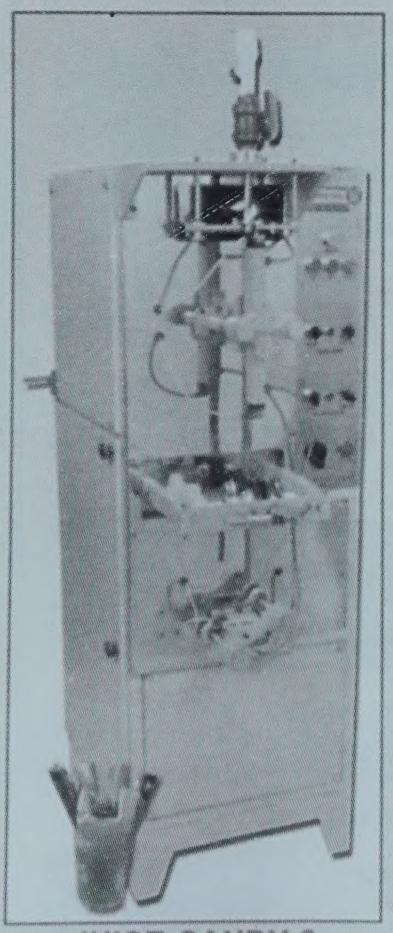

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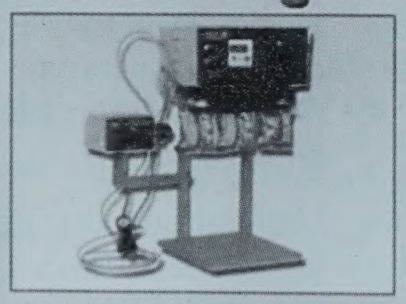

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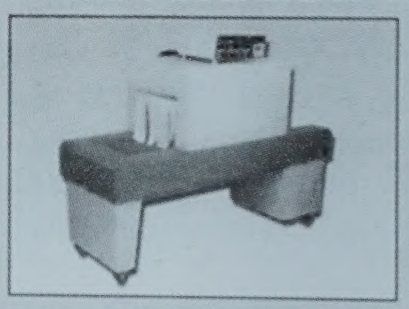

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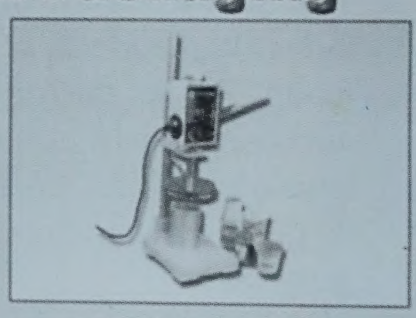

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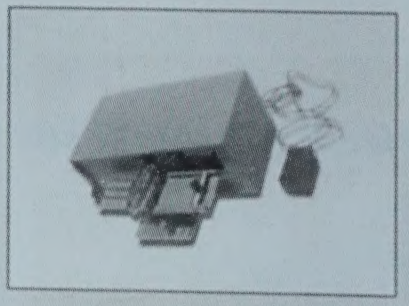

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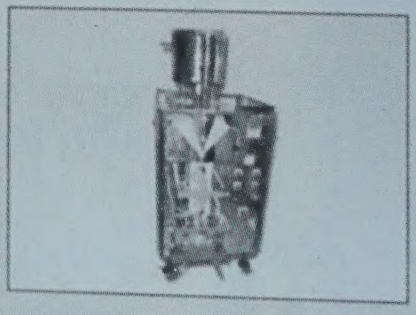

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December 2001
Vol. 28 No. 12
Mumbai

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Published, Printed, Edited & Owned by :
Norman J. da Silva

Exec. Editor : Rosalie Fernandes
Editorial Assistants : Ashley da Silva, Zarine Singh, Jeannette da Silva

Advertising Executives :

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Inter Link Trade, 32 Church Gate, Leicester, LEI 4AJ, England. Tel: 44(0)116-242-5676, Fax: 44(0)116-242-5600

Published by :
The Amalgamated Press, Narang House, 41, Ambalal Doshi Marg, Mumbai 400 001. Tel : 2650268/2654184, Fax : 91-22-2641275 Email: dasilva@vsnl.com

Printed at :
Sevak Printers, 308, Shri Hanuman Industrial Estate, G.D. Ambekar Road, Wadala, Mumbai 400 031. Tel : 411 6484

Annual Subscription:
Rs. 450.00 Post-paid
Overseas : US $ 50.00 by Airmail

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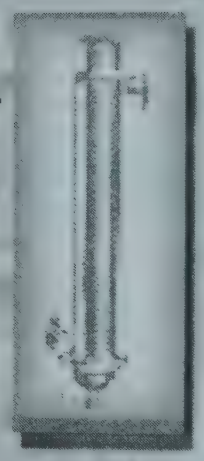

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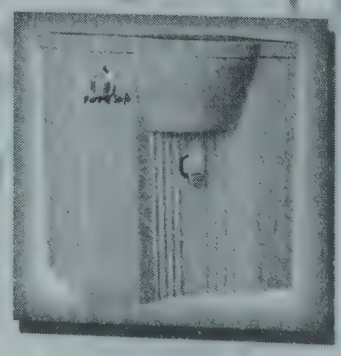

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Epidemiology of Staphylococcal Food Poisoning

by
M. Pal*

Introduction

Since ages, man has been engaged in food gathering, then later settled cultivation along with domestication of animals. Throughout these years, man had ample opportunities to come in close contact with the natural environment and animals. This led to the introduction of infections and diseases in man associated with the food they consumed. By the end of 19th century, people recognized that microorganisms were responsible for a variety of food borne diseases. In recent years, consumer awareness has played a very important role in emphasizing the need for microbial safe food for consumption. After prolonged research, it became apparent that not only microorganisms present in food were responsible for food borne diseases, but it was also because of the unhygienic practices that took place during food processing.

Techniques are developed now, which are aimed at evaluating the food processing systems, help to improve process hygiene and ultimately reduce such diseases. Otherwise serious health hazards in the form of food borne diseases may cause serious havoc among the human population.

Diseases, which are food borne, are caused by ingestion of the food containing an infectious agent or toxin or poison produced by the agent. A food borne disease outbreak is an incidence in which two or more persons consuming a common food experience a similar type of illness, mainly gastrointestinal and epidemiological analysis implicates food as a source of illness. When food contaminated with *Staphylococcus* species containing one or more *Staphylococcal* enterotoxins (SE) are ingested, then it produces gastroenteritis, which is called – *Staphylococcal* food poisoning. *Staphylococcal* food poisoning ranks as one of the most prevalent cause of gastroenteritis worldwide.

History of *Staphylococcal* food poisoning dates back to the year 1894, when it was first studied by J. Denys. In 1930, Dack showed that a filterable enterotoxin was responsible for causing *Staphylococcal* food poisoning. In India, the first recorded outbreak was in the year 1957 which was due to consumption of curd contaminated with *S. aureus* and a similar of kind of outbreak also took place in the year 1963 in which about 45 persons were affected. Since then there has been numerous reports regarding *Staphylococcal* food poisoning in man, arising due to consumption of various contaminated foods. Although we know that SE is solely responsible for causing *Staphylococcal* food poisoning, we cannot ignore the causative agent that is *S. aureus* producing it.

Parameters for the growth of S. aureus

S. aureus which was discovered by Koch in the year 1878, is a gram positive spherical and ovoid organism. The organism is aerobic and facultatively anaerobic. They can ferment mannitol and lactose, and are both coagulase positive and coagulase negative. The growth of *S. aureus* is enhanced with low acid and protein containing food that has been cooked or that has above normal levels of salt and carbohydrates. *S. aureus* for its growth in food, requires a pH range of 9.8 to 4; an optimum salt concentration of 0.5 – 4 percent; a range of 0.83 to > 0.99 of aw and temperature range of 7 to 47.8°C.

Staphylococcal enterotoxin

Enterotoxins are the toxins produced by some of the members of the genus – *Staphylococcus* predominantly *S. aureus.* Nine enterotoxins are identified till date namely A,B,C1,C2,C3,D,E,G and *H. Staphylococcal* enterotoxins are simple proteins with a molecular weight of 26,000 – 35,000D. An optimum pH of 6 – 7, salt concentration of 0.5 – 4%, > 0.99 of aw and temperature of 40 – 45°C are the parameters necessary for *S. aureus* to produce enterotoxin in food (Notermans and Heuvelman, 1983).

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Production of Staphylococcal enterotoxin

S. aureus produce enterotoxins either singly or in combination (Rosec ***et al.,*** 1997). A single enterotoxigenic strain of *S. aureus* producing more than one toxin can cause *Staphylococcal* food poisoning (Lopez ***et al.,*** 1993). Both coagulase positive and coagulase negative strains of *S. aureus* are responsible for cases of food poisoning (Udo ***et al.,*** 1999). Among all other SE(s) SEA is primarily involved in majority of the outbreaks since production of SEA occurs at shorter incubation periods in most foods than other SE(s).

Reservoirs and Sources of S. Aureus

Human, animal and environment remain the chief sources of *S. aureus* in foods. In man, *S. aureus* is seldom present in the nose and mucus secretion of nasopharyngeal region. Nasal carriers of enterotoxigenic strains of *S. aureus* include those working in slaughterhouses, meat, poultry and fish processing plants alongwith those in hospitals and restaurants (Tejero ***et al.,*** 1991 and Bustun ***et al.,*** 1996). These organisms may be transmitted from the nose of these foodhandlers to cooked food thereby later lead to *Staphylococcal* food poisoning. Similar enterotoxigenic strains of *S. aureus* may also be present in the skin, hair, throat, hand, faeces as well as lesions of *Staphylococcal* origin, of foodhandlers, which become responsible for contamination of the food (Danielson and Hellberg, 1984). Animals namely cattle, pigs and poultry, pets such as cat and dog, and even vectors like flies and cockroaches harbour *S. aureus* and thus play a very significant role in causing *Staphylococcal* food poisoning in humans. Environmental sources include clothing of nasal carriers besides food preparation equipments and even workplaces like food processing establishments, kitchen alongwith hospitals, which carry *S. aureus*. The organism ultimately gets transmitted from such reservoirs and sources to uncontaminated food due to improper handling.

Incidence, growth and enterotoxin production in various foods

Enterotoxigenic strains of *S. aureus* after its transmission to various foods through different sources, grow in food and elaborate toxins under favourable conditions thus leading to contamination of the food involved, but interestingly, do not produce any odour or taste, so such foods are accepted readily and are eaten without any suspicion. Fresh meat mainly beef, chavon, mutton and pork including poultry meat as well as fish gets contaminated with *S. aureus* and its enterotoxin during handling, processing and transportation. Since *S. aureus* survive freezing and frozen storage, frozen foods are seldom involved in outbreaks of *Staphylococcal* food poisoning (Pereira ***et al.,*** 1994). Owing to its low pH and aw, cured meat provides a favourable atmosphere for the production of enterotoxin. As a result it was also incriminated in several outbreaks. Raw milk along with colostrum and dried milk as well as other dairy products namely butter, cheese and ice cream had been the vehicle in numerous incidences (De Luca ***et al.,*** 1997). Infant foods and canned foods were frequently implicated in such outbreaks. Many a times, eggs have also caused *Staphylococcal* food poisoning in man.

Conditions necessary for an outbreak

These involve the transfer of the enterotoxigenic strain of *S. aureus* from source to the food. Secondly, food must contain a large number of enterotoxigenic strain of *S. aureus*, a good medium for growth and toxin production, optimum temperature for its growth and sufficient time for enterotoxin production. After contamination, sufficient amount of the food must be ingested containing the toxin to exceed the enterotoxin susceptibility threshold of the persons having the food. Certain unhygienic practices in the food service and processing establishments

and even home kitchen allow these conditions to occur, the sources being- contaminated waste, hand, skin infection, clothing of nasal carriers, hair and even contaminated equipments and even vectors.

Other conditions generally ignored are preparation of food too far in advance, improper warm holding that is below 60°C, improper cooling and inadequate reheating, handling of food by infected persons, inadequate cleaning of equipments and utensils, cross contamination from raw to cooked food as well as contaminated raw food itself.

Symptoms

Effective dose of SE is produced by a population of *S. aureus* more than 105 organisms per gm of the contaminated food. Level of approximately 1hg of SE/gm of contaminated food is sufficient enough to produce the symptoms of *Staphylococcal* food poisoning. Onset of *Staphylococcal* food poisoning is very sudden. The first sign that occur indicating its onset is nausea then salivation. This is followed by vomition, which occurs 2-4 hours after ingestion of the food containing the toxin.

Incidences of outbreaks

Numerous incidences of outbreaks were reported from time to time involving various foods and under different conditions from all corners of the world. Strains of *S. aureus* which were isolated from nasal and rectal swabs of camels slaughtered in the abattoirs in Nigeria, were found to be enterotoxigenic since they produce SE – A, B, C, D, or E. Thus, the contaminated camel meat was responsible for causing *Staphylococcal* food poisoning among the people consuming the meat (Adesiyun, 1985). Among all other outbreaks of *Staphylococcal* food poisoning another was reported from Finland, which occurred due to improper handling of smoked fish and ham. One incidence was reported from Federal Republic of Germany involving egg, milk products, meat and meat products as the incriminated foods (Pohn, 1986). A similar kind of outbreak among schoolchildren due to consumption of ham occurred in Rhode Island. (Richard ***et al.,*** 1990). Interestingly, it had been a common incidence in Japan, which mainly occurs due to contaminated rice balls moulded by hands.

In the Indian context, besides other outbreaks, one was reported from Mumbai in 1998 which occurred among school children due to consumption of sweet meat (Pedhas) contaminated with *S. aureus* and another from Hyderabad in 1986 involving Khoa containing SE - A, B and C. It is known that primary habitat of *S. aureus* is the udder both in diseased animals and passive carriers. When milk from such a cow was consumed, then this led to an outbreak of *Staphylococcal* food poisoning among the people during a pilgrimage in Mathura in 1986. An incidence was reported from the Government bacon factory (Ranchi), where due to the contamination of air, working surface and water supply, pork got contaminated during its processing, with *S. aureus,* and thus became the cause of food poisoning among the people consuming the pork (Nanu, 1992).

Though cases were reported about *Staphylococcal* food poisoning from time to time, they could not be accepted as the actual reports since due to the short incubation period and negligence of victims in seeking medical help, most of the cases go undiagnosed. Inspite of public awareness, outbreaks of foodborne diseases are under reported and grossly neglected even in developed countries. In India, this type of food poisoning is not recognized as a threat to public health. Therefore attention is not paid to any such outbreaks, which occur once in a while and does not involve the entire community like cholera etc. *Staphylococcal* food poisoning outbreaks and above all, even foodborne diseases are not categorized separately in the Health Statistics of the country but have been categorized under acute diarrhoeal diseases. But with whatever reports available, it is stated that foodborne diseases comprises about one fifth of the total diseases occurring in the world among which *Staphylococcal* food poisoning is the most common and widespread occurring in both the developed and developing countries. It has been estimated by WHO that ratio of actual to reported cases of food borne diseases varies between 25:1 to 100:1.

Diagnosis of Staphylococcal food poisoning

A physician approached by a victim of *Staphylococcal* food poisoning, solely depend on the history and clinical symptoms of his patients. Specimens which are obtained to analyse the occurrence of the food poisoning include food (left over), vomitus and stool. Epidemiological and public health workers may collect swabs of nose, throat, cultures of skin lesion and even mastitic milk. Direct microscopical examination of food by Gram's technique, isolation and identification of *S. aureus* helps to determine only the presence of the organism in the food incriminated in the outbreak.

Even though we carry out different tests, we cannot come to a solid conclusion that there has been a case of *Staphylococcal* food poisoning. So for this, detection of enterotoxin in the incriminated food is a must. There are many diagnostic methods developed for the detection of enterotoxin in contaminated food. Among the conventional methods of diagnosis for safe food production, monitoring and surveillance of production facilities along with operations and microbiological testing of the finished products for detection of pathogen and its toxin remain the primary one. The other method that follows is the storage test, which simulates the microbiological changes that occur in the finished products after processing, distribution and handling by the consumer. The results indicate probable exposure of consumer to the target pathogen.

For management of safe food production, good manufacturing practices are developed which are the first quality assurance accepted by the food industries nowadays, that supplement the end product testing based on plant design, working procedures, hygienic condition of workers and disinfection of the plant.

Another highly recognized and effective management system is the Hazard Analysis and Critical Control Point. It is a structured approach to the identification, assessment and control of microbial hazards in any particular food operation. It aims to identify the problems before they occur and establish control measures.

Among other current techniques for detection of enterotoxin in the incriminated food, the following methods are applied more because of their reliability – DNA assays, Thermonuclease activity, Microcalorimetry, Enzyme Linked Immuno Sorbent Assay, Polychromase Chain Reaction, Digoxigenin Labelled Gene Probe, Pulse Field Gel Electrophoresis, Portable Fibre-Optic Biosensor and Enzyme Amplified Colometric Immunoassay, Immunoenzyme method, Western Immunoblotting, Portable Fibre-optic Biosensor and Immunoblot technique (Freed ***et al.,*** 1982; Fluer ***et al.,*** 1991, Orden ***et al.,*** 1992; Levine ***et al.,*** 1996; Templeman ***et al.,*** 1996; and Rasooly and Rasooly, 1998).

Prevention and control

There is no specific treatment for *Staphylococcal* food poisoning. It is only symptomatic. The eradication of this potential health hazard depends mainly on control and preventive measures. The main objectives of prevention and control are:

1. Limit contamination of food with *S. aureus* through isolation or destruction of *S. aureus* at their source.
2. Inhibit the growth of *S. aureus* and subsequent toxin production by maintaining hazardous foods at proper temperature for a suitable length of time, cold storage for longer period, rapid cooling of cooked food and control of moisture and pH at low levels.
3. Destruction of *S. aureus* in food before SE production through proper heating in order to kill the organism. These measures are only aimed at inhibiting or destroying *S. aureus* since techniques to eliminate the toxin present in the contaminated food, have not yet come up. Apart from these measures supervision of the day to day activities in the food processing and serving establishments as well as training and educating the workers along with the foodhandlers about the contamination of food, may reduce the chances of outbreaks to a considerable level.

Conclusions

Staphylococcal food poisoning is a potential health hazard caused by ingestion of food containing one or more enterotoxin.

Man serves as a major reservoir of ***S. aureus*** including animals and environment all of which play their roles in contaminating the food. Factors which affect the growth, survival and enterotoxin production in the food including improper handling and unhygienic practices are responsible for the intoxication. Diagnosis is mainly based on the detection of the enterotoxin in the implicated food. However, more sensitive methods for early detection of enterotoxin in the food are yet to be developed. Preventive measures are undertaken as well as educating the public regarding the hazards of *Staphylococcal* food poisoning in order to reduce the risk of intoxication because of its public health significance.

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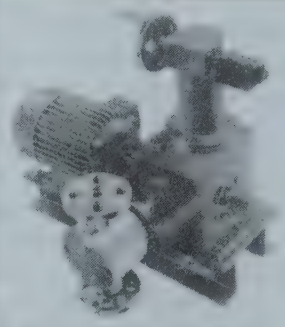

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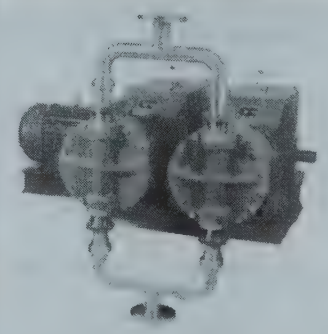

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DEALERS ENQUIRIES SOLICITED

Food Quality and Safety-An Overall View

by
Satish Checker

Introduction

Food Processing Industry has made tremendous progress in the past few years. With the increasing awareness about the quality of the food products and the competitiveness due to liberalisation a large number of multinationals (MNC) are entering the food processing sector, the Indian Industry may find it difficult to match their quality. Today's food processing industry is considerably interested in new packaging and processing techniques which promises to preserve the food products without heat or chemical additive and deliver the foods fresh in taste, texture and appearance. The price factor is no longer valid, the emphasis has turned on quality assuring the safe food, hygienic, wholesomeness and consumer acceptability. The food processing industry must achieve national and internationally accepted quality standards to ensure a place in the emerging markets. Also the industry must adopt the quality management systems coupled with IS-9000 standards and HACCP systems.

Quality control and assurance

Quality is perhaps the most critical aspect for the manufacturer or supplier to concentrate on. Quality control and standardisation are essential perquisites for efficient quality assurance system. In order to meet the sustained quality the following aspects with respect to quality assurance must be monitored.

Quality of Incoming Raw Materials:

The most important part being the assessment of the quality of the incoming raw materials. The quality of the finished products heavily depend on the quality of raw materials. Standards like AGMARK, BIS, PFA, FPO wherever applicable may be adopted or a standard with acceptable criteria-enumerating the various tests with their limits framed may be documented.

In-Process Control of Semifinished and Finished Products:

The In-Process products have to be verified for the quality and conformance to specified requirements or acceptable standards. Packaging instructions must be issued according to the status of the products tested.

Finished Products, Handling, Storage, Packaging Preservation and Delivery:

The packed finished products for delivery may be assessed at random for their quality before despatch. Also the physical verifications of the packaging and the labelling requirements be verified. The packed products must be stored under hygienic conditions.

Control of Packaging/Packing Materials:

The polymeric containers/pouches etc. used should have a documented declaration from the manufacturer/supplier ensuring its food grade quality. Corrugated Cartons/Packings may be assessed for its physical stability and printing uniformity.

Food Safety

Food safety may be broadly categorised as follows.

— Hygienic conditions of production/processing and storage.
— Bacterial contamination.
— Chemical Contamination.
— Toxic contamination

Hygienic Condition During Processing, Packaging and Storage:

The safety of the food is principally assured by the control of hygienic conditions at the source of production and processing. The process of safety becomes complex because of the handling of large quantity and variety of foods that reaches the consumer. As the unhygienic hazards are borne by the food material, product and all subsequent operations must ensure their control after production, processing, distribution and storage.

Microbial Contamination:

The microbiological contamination is the major source of hazard in food contamination. It has been stated that microbiological contamination of food is perhaps the most wide spread health problem in the contemporary world. For safe food microbiological criteria should be established and rather freedom from pathogenic micro organisms must be ensured including the raw materials, ingredients and finished products at any stage of production/ processing. The microbiological creteria must be applied to define the distinction between acceptable and unacceptable foods.

Chemical Contamination: The use of chemicals in the production of food products not only masks the quality, disguises the deterioration and constitutes deliberate adultration which is potentially very harmful to health.

The chemical contamination may be classified as

Food Preservatives: It is advised that the food preservatives like colouring matter, food additives, artificial sweetening agents, antioxidants, emulsifiers/ stabilisers, flavour/flavour enhancer etc if used, should be of approved quality and processed under good manufacturing practises.

Metallic Contamination: The metallic contamination of the food products may take place during processing in unhygienic metal containers, use of non-standard raw materials/ingredients, chemicals etc. The major metallic contaminants occurring in food products are -Lead, Copper, Tin, Arsenic, Chromium, Iron, Nickel, Mercury, Cadmium.

Pesticides/Insecticides: The agriculture products used in the food processing like food grains, cereals, oil seeds, fruits and vegetables are generally contaminated with high levels of residual pesticides/insecticides which are sprayed during cultivation.

Toxic Contaminants

Some of the toxic contaminants occuring in cereals, grains etc are

— Aflatoxins
— Argemome Oil

It is suggested that food industry must adopt the latest emerging technologies which helps in quality improvements and upgradation of the processed foods and also to use the raw materials and ingredients of approved standard quality.

Also the food products must be made available in suitable food grade packaging which helps enhanced shelf life, maintenance of hygienic conditions, protects from microbiological contamination, insect infestation and retention of its wholesomeness.

It is therefore a great social responsibility of the food processing industry to protect the interests of the consumers and to process and supply safe food.

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Preservation of Paneer — A Review

by
S. Makhal and D.C. Sen

Abstract

Paneer is not only a potential winner of the wide spectrum of indigenous dairy products but also contributes high profit margin. Systematic coverage of paneer technology with its successful preservation for organised marketing and distribution may add a new margin to the development of cottage dairy industry of our country. Lot of investigations have been made so far on the preservation of paneer to extend its shelf-life. The present review includes a broad range of research on the techniques of preservation of paneer with lucid emphasis on the chemical methods suggested so far to preserve paneer. The aim of this review is to stimulate food scientists and nutritionists on the days ahead to innovate the new methods for preservation of this ancient delicacy.

Introduction

In the recent past, the popularity of paneer has transgressed the limit of North-Western India and India as a whole, and is now being popularly consumed in several Western countries also. About 5 percent of the total milk produced in India is converted into paneer and is mostly prepared by the unorganised sector of the dairy industry (Mathur, 1991). The consumption of traditional milk products, especially the products like paneer, curd and khoa, is likely to grow at an annual growth rate of more than 20 percent (Thakur and Roy, 2000). The present estimated paneer production in India is 3,00,000 tonnes per annum valued about Rs 1,050 crores (Mathur, 1998). It is evident from the above facts and figures that there is an enormous potential lying ahead in trading of paneer. But paneer is highly perishable product and suffers from low shelf-life because of its high moisture content. With the application of existing techniques employed for the production and packaging, the shelf-life of paneer is only one day at ambient temperature, while it is about one week at refrigerated temperature (Bhattacharya ***et al.,*** 971; Vishweshwaraiah and Anantakrishnan, 1985) which poses a crucial riddle in widespread distribution and marketing of the product. Inspite of its tremendous market potentiality not only in India but also abroad, organised dairy industry has so far not shown very much interest in this product. Hence, successful preservation of paneer may show a new horizon to the profit seeking enterprises.

To achieve the goal, for the past three decades, a number of chemical and physical treatments have been suggested by several food scientists to preserve paneer. This article reviews the literatures to delineate various researches conducted perspicuously on the preservation of paneer which will give enough enthusiasm to the food faddists to bring about innovation in the technique of preservation of paneer so that it can rush to the kitchen of more people with highest quality and most nutrition.

Techniques of preservation of paneer

Since past two decades, a lot of endeavours have been made by several investigators for the preservation of paneer. Preservation of paneer is yet a challenge to the food scientists which is giving an ardent zeal to conduct further research in achieving the goal. Application of a variety of chemical preservatives has been attempted in controlling the surface spoilage of paneer which includes brine (Sachdeva, 1983; Singh and Kanawjia, 1988; Singh ***et al.,*** 1989), Delvocid (Sachdeva, 1983), sorbic acid (Ranawat ***et al.,*** 1983; Singh ***et al.,*** 1989), potassium sorbate (Thakral, 1986), benzoic acid (Modi and Jain, 1988), and synthetic antioxidants (Pawan Kumar and Bector, 1991) etc. Due to lack of absolute evidence of non-toxicity of chemical preservatives in terms of physiological, pharmacological and biochemical behaviours, many consumers and even the most civilized people are scorning the use of chemical preservatives in foods. Enough enthusiasm has, therefore, been observed among the food scientists to suggest some physical treatments and the use of "GRAS" ("Generally Recognized As Safe") additives. These include vacuum packaging (Sachdeva and Prakopek, 1992), low temperature storage (Arora and Gupta, 1980; Vishweshwaraiah, 1979), dehydration (Vishweshwaraiah, 1987; Singh ***et al.,*** 1995 - '98), heat sterilization (Sachdeva, 1983), thermal texturization (Rao, 1991), application of Hurdle Technology (Rao, 1993), and the use of some "GRAS" additives (Makhal, 2000) etc. However, the above points in a nutshell have been discussed below.

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Chemical treatments

Brine

The use of 5 percent brine as dipping medium was suggested by Sachdeva (1983). He reported that such treatment enhanced the shelf-life of paneer to 22 days under refrigeration. Shukla ***et al.,*** (1984) observed a shelf-life of 6 days at room temperature when raw paneer was dipped in 18 percent salt solution for 30 minutes but fried paneer dipped in salt solution could be stored well for more than 12 days without developing any rancid flavour. Singh and Kanawjia (1988) reported a shelf-life of 16 days at refrigerated temperature using salt solution as dipping medium. Overnight dipping of paneer in brine solution followed by packaging and storage at refrigerated temperature could enhance its keeping quality upto 12 days (Singh ***et al.,*** 1988). Efficacy of acidified brine in preservation of paneer was also investigated by Sachdeva and Singh (1990). They reported that acidification of brine (pH. 5.5) had a slight deterimental effect on the shelf-life of paneer and reduced its storagibility from 22 to 20 days. Makhal (2000) achieved a shelf-life of 20 days at refrigerated temperature (5±1°C) dipping in chilled (4 - 6°C) brine (4.5%) for 2 hours followed by packaging in polythene pouches (550 gauges), presterilized with hydrogen peroxide solution (20% v/v).

Hydrogen peroxide

Dipping of panner in hydrogen peroxide water (0.2%) extended the shelf-life of paneer to 22 days at refrigerated temperature but mouldy flavour developed at the end of storage (Sachdeva and Singh 1990).

Delvocid in combination with hydrogen peroxide

Delvocid, a non-toxic antibotic produced by *Streptomyces natalensis* has strong antifungal property and proved effective to check surface mould growth (Kuila, 1997). Sachdeva (1983) conducted a study to investigate the preservative effect of Delvocid on paneer in combination with hydrogen peroxide (germicide). Delvocid (0.5%) when used in combination with hydrogen peroxide (0.2%) produced good result by extending the shelf-life of paneer upto 32 days at 8 to 10°C. Sachdeva and Singh (1985) reported that if paneer is immersed in 0.5% Delvocid solution for 1 to 2 minutes and stored under refrigeration, the deterioration in flavour of paneer so treated can't be checked and the samples spoiled after 8 days. Delvocid, the commercially available Pimaricin / Natamycin may be a potential preservative to control the mould growth in paneer as the intake level of 0.3 mg/kg. body weight recommended by the Joint FAO/WHO Expert Committee of Food Additives, is not attained even by consumption of extreme quantities of Delvocid treated (Sachdeva and Singh, 1985) paneer.

Sorbic acid

Ranawat ***et al.,*** (1983) observed that dipping of paneer in sorbic

acid solution (1000 ppm = 0.10%) and rubbing the surface of paneer block treated as such with 0.25% sorbic acid was very effective against the spoilage caused by moulds. Paneer so treated could be preserved upto 6 weeks at 0 to 4 °C without any loss in wholesomeness. Singh ***et al.,*** (1989) also studied the efficiency of sorbic acid in preservation of paneer. They observed a shelf-life of 36 hours at room temperature (32°C) with the addition of sorbic acid (0.15%) to milk and subsequent wrapping of paneer in sorbic acid coated butter paper (2mg/m^2). Singh ***et al.,*** (1991) advocated that combination treatment of 0.10% sorbic acid in milk and irradiation of the product at 2.5 KGy preserved the paneer for 30 days at ambient temperature (25-35°C) giving good acceptance score. Paneer made from buffalo milk and coconut milk blend (80:20) was acceptable upto 18 days at refrigerated temperature while the milk was treated with sorbic acid (0.15%) (Roy, 1999). He also reported that preservative effect of sorbic acid is mainly due to the inhibition of dehydrogenase enzyme system in moulds.

Potassium sorbate: Salts of sorbic acid was also used in preservation of paneer but their concentration must be judiciously selected. Use of sorbic acid and sorbate is limited to a concentration of 0.75% or less in cheese products to avoid bitterness (Bradley and Harman, 1962; Rhodes and Harman, 1964).

Thakral (1986) suggested that the incorporation of 0.1% potassium sorbate enhanced the shelf-life of paneer from 6 days to 18 days at 5°C. It was observed that paneer containing 0.1% potassium sorbate could be preserved upto, 13, 3-4 and 1 days a 7, 22 and 37°C, respectively (Thakral ***et al.,*** 1990). They also indicated that paneer could be preserved further by adding nisin together with potassium sorbate. But the use of potassium sorbate solution (2.0%) as dipping medium did not favour the extension of shelf-life of panner. Paneer so treated was acceptable well only upto 10 days (Sachdeva and Singh, 1990).

Benzoic acid: Benzoic acid is more effective against yeast and moulds than bacteria (Desrosier and Desrosier, 1987). Hence, its effectiveness in preservation of paneer was also investigated. Modi and Jain (1988) reported the use of benzoic acid (1200 ppm = 0.12%) for enchancing the shelf-life of paneer to 40 days at refrigerated temperature and 20 days at room temperature (37°C). The inhibitary effect of benzoic acid may be due to the fact that it blocks the oxidation of glucose and pyruvate at the acetate level (Bosund, 1962).

Chlorinated water: Use of chlorinated water (35 ppm) was also attempted to improve the shelf-life of paneer, but it did not extend the shelf-life of paneer. Rather, it had detrimental impact on the flavour score of paneer (Sachdeva and Singh, 1990).

Acidified water: Sachdeva and Singh (1990) highlighted that the use of acidified water (pH 5.5 and 2.5) did not favour the extension of shelf-life of paneer. The samples spoiled after 6 days at refrigerated temperature. At pH 2.50, the deterioration was also as rapid as at pH 5.50.

Buffered water: Use of buffered water (pH 7.5) was also tried in preservation of paneer but it did not produce any fruitful result (Sachdeva and Singh, 1990). They observed that the buffer solution of sodium bicarbonate and calcium phosphate containing 2.5% of each salt (w.w) at pH 7.5 when used as dipping medium caused deterioration in paneer and the samples spoiled just after 8 days.

Efficacy of antioxidants: A study to explore the efficiency of Tartiary Butyl Hydroquinone (TBHQ) and Butylated Hydroxy Anisole (BHA) in enhancement of shelf-life of paneer was conducted by Pawan Kumar and Bector (1991). Paneer samples were analysed chemically, microbiologically and organoleptically throughout the storage period at 5, 15 and 25°C. The results showed that two antoxidants, either individually (0.05%) or together (0.05%) were considered to be effective in extending the shelf-life of paneer to about 20, 7 days and 90 hours at 5, 15 and 25°C, respectively against 10,4 days and 48 hours for the control samples.

Packaging Materials

Selection of suitable packaging material is an essential aspect of successful preservation of paneer. Sachdeva (1983) reported that paneer packed in parchment paper could be stored for 8 days under refrigeration, while for 16 days in tightly wrapped heat shrink film (Cryovac). It was also suggested that packaging of paneer with water instead of whey used customarily for dipping was effective in preservation of paneer. Sachdeva ***et al.,*** (1985) reported a rind formation that enclosed the whole block on the 2nd day of storage while using parchment paper for packaging. Rind formation provided a tough surface which could be paraffined in order to further improve the shelf-life of paneer. Use of saran coated packaging film was also attempted in extending the shelf-life of paneer to a great extent (Kanawjia ***et al.,*** 1990). Jha and Bargale (1999) reported that the shelf-life of paneer could be enhanced from one day to 15 days under refrigeration and from 6 hours to 3 days at ambient temperature by packaging of soy-paneer under water submersion in glass bottles and LDPE bags which was heat treated by submerging the sealed packages in water bath at 75°C for 30 minutes. Bector ***et al.,*** (1995-'98) also investigated the suitability of some packaging materials including LDPE, 200 gauge, opaque, MXXQ 300, 100 guage and MST cellulose film, 300 gauge in enhancing the keeping quality of paneer. Among them, last two packaging materials produced better results in terms of physicochemical changes during storage than the first one.

Physical treatments

Vacuum system: Application of vacuum packaging in enhancing the shelf-life of paneer was also reported (Sachdeva ***et al.,*** 1985). Singh and Kanawjia (1990) observed the efficiency of vacuum packaging in increasing the shelf-life of control samples and the samples dipped for 2 hours in solution of i) hydrogen peroxide (0.2%); ii) Delvocid (0.5%); iii) hydrogen peroxide (0.25) and Delvocid (0.5%) from 10, 12, 25 and 35 to 14, 18, 35 and 50 days, respectively. It was reported that cow milk paneer could be preserved upto 38 days by adopting vacuum packaging (Sachdeva ***et al.,*** 1991). Sachdeva and Prokopek (1992) also observed that paneer could be preserved for more than 38 days by vacuum packaging.

Low temperature storage: Arora and Gupta (1980) investigated the effect of low temperature storage (10, -13 and -32°C) on preservation of paneer. Physico-chemical and sensory evaluation at regular intervals showed that no significant changes occurred in paneer preserved at 10°C for 6 days but on the 7th day, pH declined and development of putrid flavour occurred. On storage at -31°C and -32°C, the product remained acceptable upto 120 days but the body and texture became crumbly and fluffy on thawing, but was considered suitable for frying. Vishweshwaraiah (1979) reported that frozen paneer (-9 or -15°C) had a shelf-life of upto 8 days, although surface drying was observed. Acceptability of preserved samples of frozen paneer (-28 to -30°C) was also reported by Kanawjia and Singh (1996). With the aim to increase the shelf-life of paneer, an industrial process for manufacture of paneer frozen in cubes has been developed in close collaboration among the R & D laboratory of National Dairy Development Board (NDDB), Gujrat Co-operative Milk Marketing Federation (GCMMF) and Vidya Dairy (Deniau-e, 1998).

Dehydration of paneer: Vishweshwaraiah (1987) suggested a method of preservation of paneer by dehydration. He reported that dehydrated extruded paneer (drying at 75°C for 2 hours) could be stored well upto 2 months against 3 days for the control samples. But the rehydration characteristic of dehydrated paneer (moisture: 5-9%) was poor and it lacked proper cohesive properties. Singh ***et al.,*** (1995-'98) reported that hot dilution treatment involving 2.5% salt solution containing 0.25-0.5% potassium sorbate for varying periods of time and temperature range of 40-70°C for 5 to 10 minutes and then drying from 50

to 100 power for 5 and 8 minutes extended the shelf-life of paneer to 2 months while packed in polypropylene bags and stored under refrigeration. However, these paneer cubes when packed under vacuum metalised polysters had a shelf-life of 3 months under refrigeration.

Heat sterilization:
Sachdeva (1983) investigated that heat sterilization of paneer was the only effective way of improving the keeping quality of paneer at room temperature. Paneer cubes packed in tin cans and sterilized in an autoclave at 15 psi for 15 minutes were stored well over a period of 50 days at ambient temperature. Thereafter, perception of a mouldy character rendered the samples unacceptable. Slight browning coupled with a cooked flavour affected the organoleptic quality of paneer but this antagonism was overcome to a great extent during frying and cooking. He also suggested that sterilization along with small amount of water in tin cans was effective in reducing the degree of defects caused by heat sterilization. Frying of paneer cubes prior to heat sterlization was also investigated but the product deteriorated earlier due to the development of pronounced oxidized flavour within 40 days of storage. Rao (1991) developed a method to extend the shelf-life of paneer to 3 months at 30°C. The process involved concentration or UF of milk, acidification with GDL and citric acid and "In package" thermal texturization by microwave technique.

Hurdle Technology
Rao and Patil (1999) formulated a Ready-to-Eat paneer curry and preserved it with the application of Hurdle Technology applying more than one preservation parameters such as water activity (a_w) pH, Redox-potential (E_n) and heat treatment. They reported that the product could be acceptable satisfactorily upto 30 days at room temperature (30°C). Such paneer based convenience food was prepared by mild heat treatment, acidification and small reduction in water activity (a_w) with the suitable combinations of 0.8, 0.97 and 5.0, or 0.4, 0.96 and 5.0 for F value, a_w and pH, respectively (Rao ***et al.,*** 1992).

"GRAS" additives
Makhal (2000) investigated the efficacy of four "GRAS" additives viz. cardamon, clove, cinnamon and ginger in preservation of paneer. The additives were individually added to milk at the time of coagulation of milk. Ginger was added @ 5.0, 8.0, and 11.0 gm per kg milk and cardamom, clove and cinnoman were added @ 1.0, 1.5 and 2.0 gm per kg milk. Paneer samples containing ginger, cardamom, clove and cinnamon each for low dose, medium dose and high dose showed shelf-life of 32, 36 and 40 days; 28, 32 and 36 days; 24, 28 and 32 days; 24, 28 and 32 days, respectively at refrigerated temperature (5±1°C) while paneer was treated with brine (4.5%) and packed in polythene pouch (550 gauge), presterilized with hydrogen peroxide (20% v/v). Clove and cinnamon samples exhibited same shelf-life as per their respective dosage. On the basis of the sensory and physico-chemical changes during storage, medium dosage of four spices were found to be most effective and in totality, the treatment of paneer with medium dose of ginger was most effective for the preservation of paneer followed by medium dose of cardamom and clove/cinnamon, respectively.

Conclusion
Paneer may play a promising role in the economic development of both cottage and large scale dairy industry. Successful preservation technique will obviously enlarge the circumference of marketing and distribution of the product. Lots of endeavour on the preservation of this ancient dainty have been conducted, but it is a matter of remorse that the net result is still far away from the expectation. Further innovative and efficacious researches in this field should be undertaken to enhance the keeping quality of this product at room temperature with the emphasis on its techno-economic feasibility and consumers' acceptability. Attempts should be made in order to develop "spiced-paneer" with enhanced keeping quality in combination with selected spices so that it does not require further addition of spices at the time of cooking. Judicious selection of preservation method and its exploitation both in small and large scales production will illuminate the implications of so much researches on the preservation of paneer.

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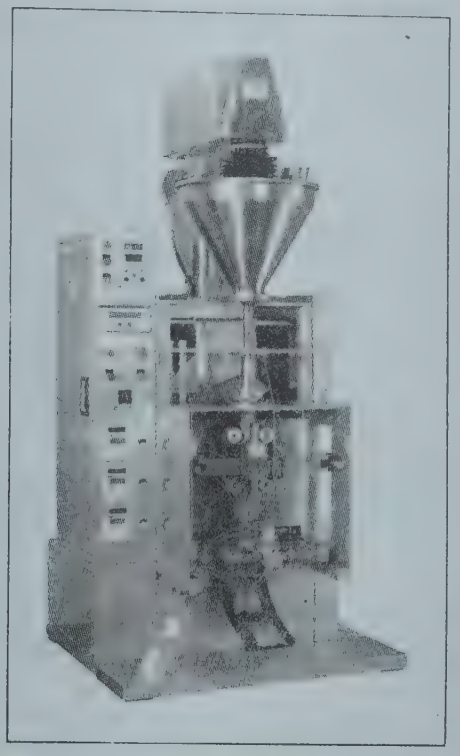

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Processing and Quality of Egg Rolls

by
R.C. Keshri, P.L. Yadav and T.R.K. Murthy

Abstract

Processing and quality evaluation of egg rolls were carried out. Attempts were made to find out suitable indigenous technique and recipe for preparation of egg roll. Physico-chemical parameters like yield, pH and proximate composition of the finished product were determined. Sensory evaluation of the product was conducted by taste panel. Microbiological profile was recorded for egg liquids and also from finished products in fresh and refrigerated stored (4±1°C) samples.

Introduction

Egg contributes a major share in the Indian poultry industry. Egg production in India has witnessed spectacular increase from 5 billion in 1970 to about 34 billion eggs in 1999. The layer industry has registered an average growth of 6 to 8% per annum against all prevailing odds. India today occupies the 5th place in egg production in the world contributing 3.5% of world egg output. The egg production is expected to reach 120 billion by the year 2020 in this country.

Per capita egg consumption in this country is, however, as low as 34. According to the National Egg Coordination Committee (Anon, 1997) about 71.5% of eggs are consumed in India at the time of breakfast. The preferred forms of egg consumption are omelets and boiled eggs followed by egg-in-curry. Some of the reasons for lower consumption of eggs in this country are 'dislike of smell', boring to eat eggs every day in limited products form, negative perceptions, seasonality, higher prices, low purchasing power of the common man, spoilage, breakage, irregular and infrequent supply in the market and also lack of convenience of carrying.

Egg and egg products have important role in solving malnutrition in human beings. Increased consumption of eggs by way of product diversification can further increase the per capita consumption and improve the nutritional status of Indian masses. Multinational fast food companies are also in the effort of exploring and establishing their markets in India. To meet the requirements in this aspect, intensive indigenous research has to be carried out on processing and development of variety of egg products in India. Published report on processing and quality of egg roll are not available. Information on recipe of reasoned and cooked frozen egg rolls have been patented in USA.

In view of this, the present work was undertaken to investigate a simpler indigenous technology for manufacturing egg rolls, a ready-to-eat, convenient fast food so as have positive impact on egg consumption and thereby to improve nutritional status of Indian masses. This may also work out as a strategy to control the seasonal over production of eggs and channelise the demand-supply line of poultry products coupled with opening new avenues in generating employment opportunities.

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Materials and Methods

Infertile shell eggs of apparently good quality were cleaned and opened manually to obtain contents of albumen and yolk separately. The two liquids were filtered through the sieves separately so as to remove membranous structure or shell grit, if any. Salt, turmeric powder and red chilli powder were added to the yolk. The albumen and yolk were beaten for a period of five minutes with the help of an egg beater, manually. Egg roll was prepared with albumen and yolk layer, alternatively. A flat thick cookware (griddle) was heated to a temperature range of 150-170°C. A little of butter oil was applied on the inner surface. The beaten albumen was poured and spread to nearly a thickness of 3 mm. It was then allowed to coagulate. The beaten yolk was subsequently poured and immediately spread over it maintaining almost the same thickness as that of albumen. It was allowed for conversion from sol to gel. The two layers which had coagulated together were now rolled into five folds and the inner and outer ends were sealed by coagulating with a little of whole egg liquid. The rolls were packaged in medium density (about 200 gauge) polyethylene bags after cooling to room temperature (25-30°C). Samples were refrigerated stored at 4±1°C for further studies.

Weight of shell eggs, liquid albumen, liquid yolk and empty shells were recorded to find out the various yields. Cooking yield of the product was determined by dividing the cooked weight of roll with the added weights of albumen and seasoned yolk and expressed in percentage. The pH values of liquid albumen and yolk was recorded directly with the help of glass electrode of a pH meter after proper calibration. For determining pH of the egg roll, 5 grams of sample in duplicate was homogenized in 50 ml of glass distilled water for a few

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Table 1 - Sensory scores* of egg roll: Mean±SE

Attributes	Fresh	Stored*
Appearance	7.75±0.19	7.64±0.15
Colour	7.75±019`	7.45±0.16
Odour	7.62±0.22	7.68±0.19
Taste	7.56±0.22	7.86±0.21
Texture	7.44±0.24	7.73±0.19
Firmness	7.31±0.22	7.64±0.24
Juiciness	7.56±0.20	7.77±0.23
Overall acceptability	7.44±0.22	7.09±0.18

* Refrigerated stored at 4±1°C for 5 days.
*Scores on 9-point hedonic scale, 9: extremely good, 1:extremely bad

minutes and the values were measured as before. Moisture, protein, ether extract and total ash contents of egg roll samples obtained from three different trials were determined each time in duplicate following the methods of AOAC (1990). Sensory evaluation of egg roll samples was conducted by a panel of judges on a nine point hedonic scale having the description as 9 being 'like extremely' and I being 'dislike extremely' for attributes such as appearance, colour, odour, taste, texture, firmness, juiciness and overall acceptability. For studies on microbiological profile, the egg contents were especially sampled before preparation of rolls. Freshly prepared roll as well as refrigerated stored (4±1°C) rolls were also sampled. Individual serial decimal dilutions of the egg content was prepared in 9 ml of 0.1% peptone water for 1minute in a presterilized blender. Individual serial decimal dilutions were prepared as mentioned above upto a 10^3 dilutions of the original food sample. Total aerobic plate count was performed using standard plate count agar with 0.1 to 0.5 ml of suitable dilutions spread onto the surface of the prepared plates which were dried overnight. Psychrotrophs were determined using standard plate count agar. Half a millilitre of suitable dilutions were surface plated as described above. For enterobacteriaceae, 1 ml of suitable dilutions in duplicate were dispersed in petridishes and 15 ml of melted VRBG agar was added with thorough mixing. After solidification, the plates were overlayed with a second layer of 5 ml VRBG. For faecal streptococci, 1 ml volume of dilutions in duplicate were dispersed in petridishes and 15 ml of melted Stanley and Barley's medium was added with thorough mixing. The total aerobic plate counts were determined after incubating the plates at 30°C for 48 hours. The psychrotrophs were determined after incubating plates at 7°C for 10 days. The VRBG plates were incubated at 37°C for 18-24 hours. The fecal streptococci plates were incubated at 37°C for 48 hours. The colonies were counted under a Qubec colony counter. Data were analysed statistically as per methods of Snedecor and Cochram (1989).

Results and Discussion

The mean weight of shell eggs used in the study was 54.14±1.87 grams. The weight of egg albumen, yolk and shell were 28.14±1.25, 18.54±1.31 and 7.46±0.04 grams respectively. Thus, these three contents were in the order of 51.98, 34.24 and 13.78% of the total egg weight. The albumen to yolk ratio was 1.52:1. The mean cooking yield of the product was 70.86±1.32%.

Preliminary trials were conducted to find out the suitable recipe for the preparation of an acceptable egg roll. The recipe finally evolved, contained ingredients such as 2% table salt, 0.5% turmeric powder and 0.5% red chilli powder in yolk. Addition of polyphosphate at the rate of 0.1% and 0.2% in the albumen were also tried. This increased the foaming ability of albumen on beating and the albumen layer in the cooked egg roll were also very soft and spongy. However, addition of polyphosphate in the liquid albumen was not practised because of the problem of adhesion on the cookware.

The sensory scores (Table 1) of the egg rolls for appearance, colour, odour, taste, texture, firmness, juiciness and overall acceptability in fresh and five days refrigerated stored (4±1°C) conditions did not reveal any significant ($P<0.05$) difference. All the attributes had the acceptability to the extent of 'like moderately' to 'like very much'.

The pH values of liquid albumen, liquid yolk and of freshly prepared egg roll were 9.22, 6.25 and 8.31, respectively. The proximate composition of fresh egg rolls showed 67.74±0.22% moisture, 14.72±0.38% protein, 14.67±0.33% either extract and 1.63±0.07% total ash contents.

Microbial counts of the egg roll varied from batch to batch of the experiments. The aerobic plate count (APC) of freshly prepared egg rolls ranged between log 1.45 to 2.75/g. These organisms were largely mesophilic spore formers. Coliforms were not detected in these samples. The bacterial counts did not increase much upto five days of storage at refriegerated temperature (4±1°C). The APC, psychrotrophs, the faecal streptococci and lactic acid bacteria, however, increase on ten days of refrigeration storage. No coliform and enterobacteriaceae were detected. The sample showed no off odour upto 10 days of refrigerated storage.

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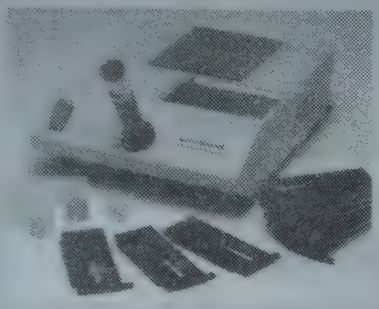

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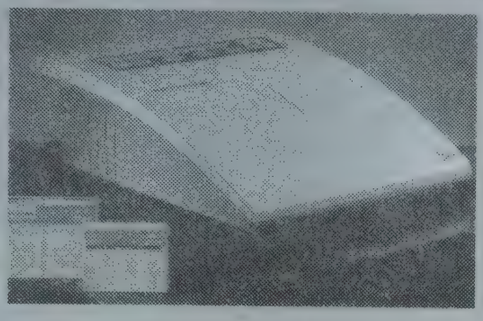

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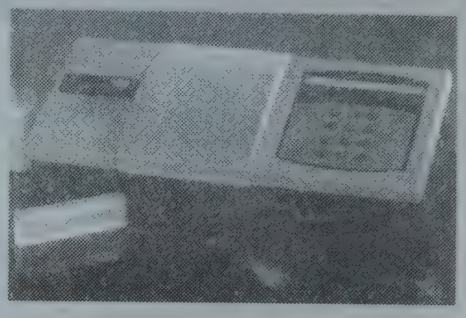

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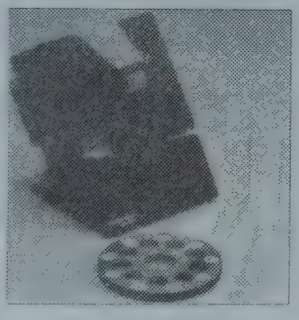

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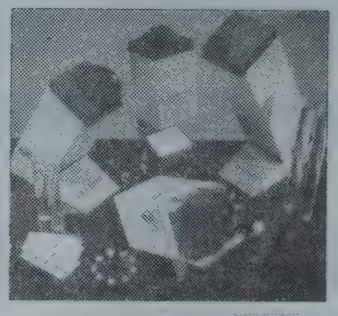

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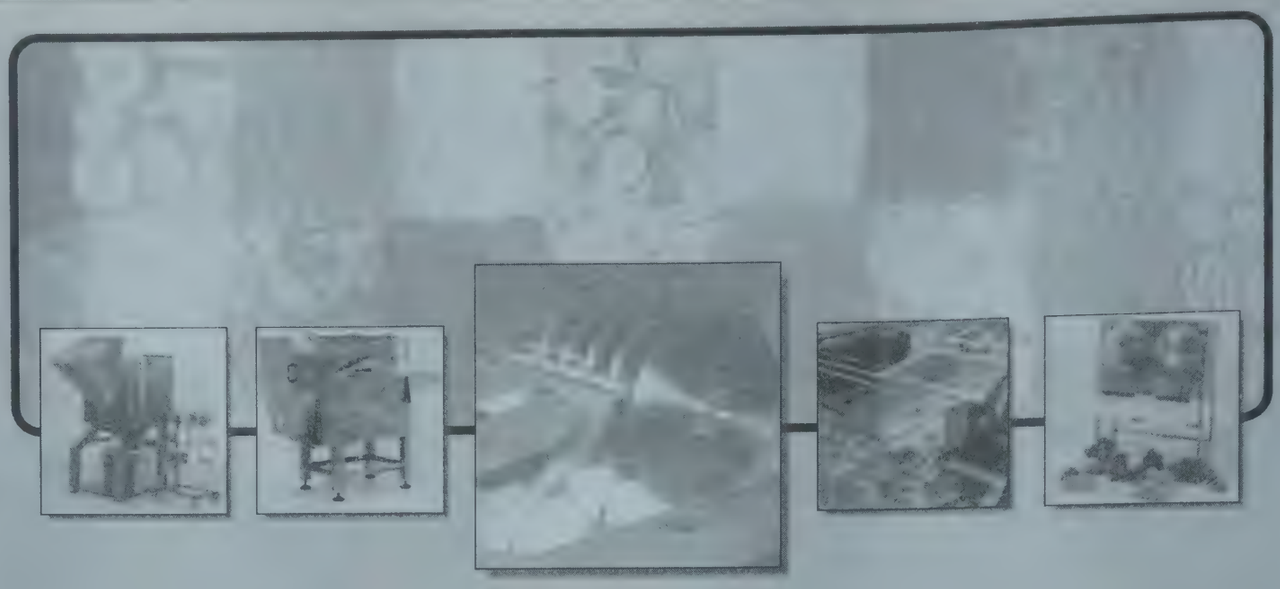

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FRUCTOSE

Effect of Pretreatments on Quality of Dehydrated Fenugreek (*methi*)

by
R. M. Birar, V. R. Farande and P. A. Unde*

Abstract
Dehydrated products from fenugreek (methi) were prepared using cold and hot brining pretreatments. The cold brining treatment of 5, 10 and 15% salt concentration for 30 minutes and hot brining treatment of 5, 10 and 15% salt concentration at 60°C for 20 minutes were given. The pretreated samples were dried in a tray dryer at 60°C ± 2°C. The effect of pretreatments on quality of fenugreek was studied. Results of study showed that better quality dehydrated products could be prepared by using cold and hot brining pretreatments. The total drying time of 6, 5 and 3 hours were found in case of controlled, cold and hot brined samples, respectively. The dehydrated products of fenugreek prepared by using 10 to 15% salt concentration at 60°C for 20 minutes were found very good (overall acceptability = 7.1 to 7.7).

Introduction
The farmer sustains substantial losses due to post-harvest glut, insufficient demand, weak infrastructure, poor transportation and perishable nature of the fruits and vegetables. The main objective of fruit and vegetable processing is to supply wholesome, safe, nutritious and acceptable food to consumers throughout the year. India ranks second in vegetable production producing about 80 Mt from cultivated area of 14 Mha. Leafy vegetables are very rich in vitamin A and C and minerals. The composition of fenugreek per 100 g of edible portion is 86.1g moisture, 4.4 g protein, 0.9 g fats, 1.5 g minerals, 1.1 g fibre, 6.0 g carbohydrates, 395 mg calcium, 51 mg phosphorus, 16.5 mg iron, 2340 micro-g carotene, 0.04 mg thiamine, 0.31 mg riboflavin, 0.8 mg niacin, 52 mg vitamin C and 49 Kcal energy (Shrivastava and Sanjeeva Kumar, 1998). It is necessary to develop the suitable technique for processing of vegetables among which dehydration is most viable and appropriate. Dehydration is important because it increases the life, reduces the weight, simplifies the transport, confirms the availability at any time, protects from enzymes and spoilage, reduces the cost of packaging, retains the flavour for long time, removes necessity of refrigeration (Patil ***et al.***, 1978). The drawbacks of conventional drying methods could be avoided using the pretreatments prior to dehydration of vegetables. These pretreatments are helpful to minimize the loss of colour and flavour and to improve the textural quality of product. In view of this, the present investigations were carried out to study the effect of pretreatments on quality of dehydrated fenugreek (*methi*).

Materials and Methods
The respective flow chart is shown in Fig. 1. Three Kg of fresh and fully matured fenugreek (*Trigonella foenum gaecum*) was taken for each experiment. The samples were prepared by destalking and removal of unwanted material. The prepared samples were further pretreated using cold and hot brining treatments. The surface moisture of pretreated samples was removed by putting them on a blotting paper/dry cloth. These samples were further dried in a tray dryer.

Pretreatments: The prepared samples were pretreated using cold and hot brining treatments. Blanching was done in boiling water at 96±2°C for 3 minutes prior to cold brining. The cold and hot brining treatments were given using NaCl + 0.1 % KMS. The salt concentrations of 5, 10 and 15 % and salt solution to sample ratio as 2:1 were taken. The cold and hot brining treatments were given for 30 and 20 minutes, respectively. The samples were removed and excess brine was drained off. The samples were further dried in a tray dryer to get dehydrated products of moisture content 2 to 4 %.

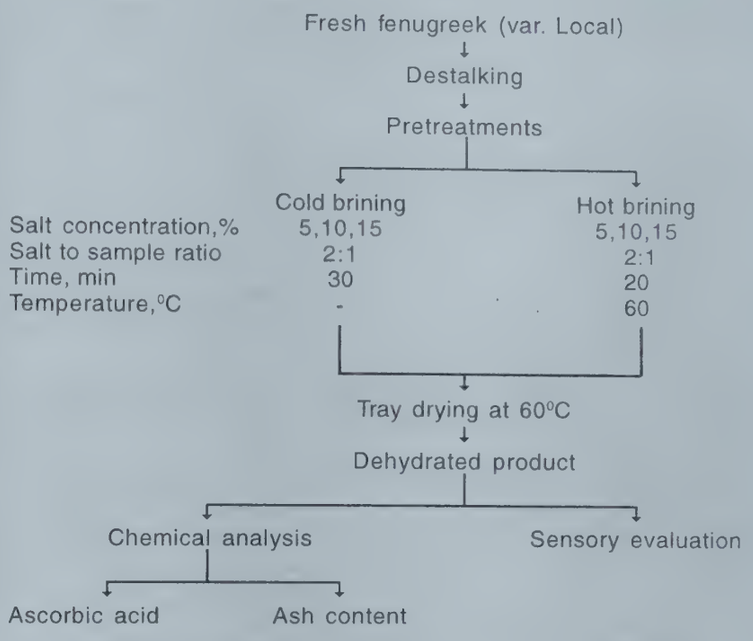

Fig.1: Flow chart for drying of fenugreek (*methi*)

Dehydration ratio: Dehydration ratio was determined by using formula,

$$\text{Dehydration ratio} = \frac{\text{Weight of raw material}}{\text{Weight of dehydrated material}} \quad (1)$$

Ascorbic acid: Ascorbic acid content of the sample was calculated from the following formula (AOAC, 1975)

$$\text{Ascorbic acid, mg/100 g - ml} = \frac{\text{Titrate} \times \text{dye factor} \times \text{volume of extract}}{\text{ml of extract taken} \times \text{wt. of sample}} \times 100 \quad (2)$$

Ash content: The material was ashed at about 525°C for 4 to 6 hours. The dishes were cooled and weighed. The difference in weights gave the total ash content as per the formula (AOAC, 1975).

$$\text{Ash content (\%)} = \frac{W_3 - W_1}{W_2} \times 100 \quad (3)$$

Where, W_1= weight of crucible , W_2= weight of sample taken, W_3 = weight of crucible with ash, g.

Sensory evaluation: The sensory evaluation of different organoleptic properties viz., colour, flavour and taste were carried out by a panel of 10 semi-trained judges on the basis of 9 point hedonic scale (Anon,1971). The average score was calculated for individual organoleptic property. The overall acceptability of the product was taken as the average score of all these organoleptic properties.

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Results and Discussion

Effect of pretreatments on moisture content

The reduction in moisture content due to pretreatments was determined and tabulated in Table 1. The moisture content reduced by about 0.7 to 1.5 % and 1.0 to 1.7 % due to cold and hot brining treatments, respectively.

Table 1: Moisture content of fenugreek during various treatments

Treatment No.	Treatment details	Initial M.C., % (w.b.)	M.C. after blanching, % (w.b.)	Increase in M.C. after blanching (%)	M.C. after brining, % (w.b.) CBT*	HBT**	Reduction in M.C., % (w.b.)
T_1	Control	87.8	-	-	-	-	-
T_2	CBT, 5%	85.2	87.4	2.2	86.7	-	0.7
T_3	CBT,10%	85.2	87.4	2.2	86.0	-	1.4
T_4	CBT, 15%	85.2	87.4	2.2	85.9	-	1.5
T_5	HBT, 5%	88.7	-	-	-	87.7	1.0
T_6	HBT, 10%	88.7	-	-	-	87.5	1.2
T_7	HBT, 15%	88.7	-	-	-	87.0	1.7

*CBT = Cold bringing treatment **HBT = Hot brining treatment

Quality of dehydrated products

The results on quality of dehydrated products viz., dehydration ratio, ascorbic acid and ash content were determined and tabulated in Table 2.

Table 2: Effect of pretreatments on dehydration ratio, ascorbic acid and ash content

Treatment No.	Treatment details	Dehydration ratio	Ascorbic acid (mg/100g)	Ash content (%)
T_1	Control	8.8:1	3.7	10.0
T_2	CBT, 5%	6.4:1	24.1	19.8
T_3	CBT, 10%	5.5:1	21.2	20.1
T_4	CBT, 15%	4.1:1	26.9	20.6
T_5	HBT, 5%	5.3:1	29.2	22.3
T_6	HBT, 10%	5.2:1	30.4	25.0
T_7	HBT, 15%	4.0:1	32.1	25.9

CBT = Cold brining treatment HBT = Hot brining treatment

Dehydration ratio

The dehydration ratio for all the products prepared using different treatments were determined and tabulated in Table 2. The dehydration ratio varied between 4.0:1 to 8.8:1.The maximum dehydration ratio was obtained in case of control (8.8 :1), followed by CBT 5% (6.4:1). Minimum dehydration ratio was obtained in case of 15% HBT (4.0:1). This shows that the hot brining treatment 15 % salt concentration required 4 kg of fresh fenugreek sample to get 1 kg of dehydrated product compared with 8 to 9 kg of sample without treatment (control) to get 1 kg of dehydrated product. These results showed that better quality dehydrated products could be prepared from fenugreek at cheaper rate.

Ascorbic acid

The ascorbic acid of fresh fenugreek was 67.0 mg/100 g compared with that of 52.0 mg/100g given by Shrivastava and Sanjeeva Kumar (1998). The variation in ascorbic acid due to effect of dehydration and pre-treatments is tabulated in Table 2. It is observed from Table 2 that there is decrease in ascorbic acid due to dehydration of fenugreek. The maximum decrease in ascorbic acid was seen in case of cold brined samples (24.1 to 26.9 mg/100g) followed by hot brined samples (29.2 to 32.1 mg/100g). The maximum retention of ascorbic acid was found in 15 % HBT samples (32.10mg/100g) followed by 5% and 10% HBT samples (29.2 to 30.4 mg/100g). The minimum retention of ascorbic acid was found in case of control samples (3.7 mg/100g).

Ash content

The initial value of ash content was 67.0 %. The ash content of dehydrated products was determined and tabulated in Table 2. The ash content varied between 10.0 to 29.5 % for all the dehydrated products. The maximum ash content was found in case of hot brined samples (22.3 to 25.9%) followed by cold brined samples (19.8 to 20.6 %). The minimum ash content was seen in case of control samples (10.0 %). Ash content in HBT samples was maximum indicating that the dehydrated product prepared using HBT showed higher nutritive value.

Organoleptic Properties of Dehydrated Products

The sensory evaluation was done for various organoleptic properties viz., colour, flavour, texture and taste. The overall acceptability of the products are determined and tabulated in Table 3. Product grade was given on the basis of overall acceptability score. The overall acceptability of dehydrated products varied between 3.7 to 7.7. Maximum overall acceptability was found for the product prepared by using 15 % HBT (7.7) followed by products prepared by using 15 % CBT (6.0). The minimum overall acceptability was found for controlled sample (3.7). This showed that the dehydrated products of fenugreek prepared by using HBT were found very good whereas dehydrated products prepared by using CBT were found good quality product.

Table 3: Data on organoleptic properties of dehydrated products

Treatment No.	Treatment Details	Colour and Appearance	Flavour	Texture	Taste	Overall Acceptability
T_1	Control	4.3	3.0	4.0	3.6	3.7
T_2	CBT, 5%	5.5	5.5	6.0	6.0	5.7
T_3	CBT, 10%	6.4	6.0	5.7	5.0	5.6
T_4	CBT, 15%	6.5	6.0	6.0	5.5	6.0
T_5	HBT, 5%	7.0	7.5	6.5	6.9	6.9
T_6	HBT, 10%	7.4	7.0	6.8	7.3	7.2
T_7	HBT, 15%	7.5	7.9	7.3	8.0	7.7

Score: 1-3 = Fair, 3-5 = Average, 5-7 = Good and 7-9 = Very good.

CBT = Cold brining treatment HBT = Hot brining treatment

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Effect of Osmotic Dehydration of Guava

by
S. Kannan and A. Susheela Thirumaran

Abstract

Guava fruit with its high moisture content faces storage problems during seasons. To increase its high shelf life osmotic dehydration was carried out where sliced guava were treated with sugar, salt, salt + sugar and spices solutions. The osmosed guavas were dehydrated and packed in polyethylene bags (100 and 200 gauge thickness). The yield of dehydrated products was more in spices treated samples for Lucknow 49 variety. The chemical constituents like moisture, acidity and reducing sugar content were found to increase, and pH, total sugar and Vitamin-C content were found to decrease when stored for six months. The spices treated guava was the best among the all the treatments.

Introduction

Guava is one of the most important commercial fruit crops of India. The fruit is very hardy and long-lived in tropical and subtropical climates. It has a sweet aroma and a refreshing acidic flesh. An annual yield of 2700 tonnes was obtained from a total area of 30,000 hectare. There are two main varieties of guavas namely Lucknow-49 and Hafsi and Pink fleshed, the former being more popular is extensively cultivated.

The main nutrient in guava is vitamin-C which provides 200 to 300mg/100g. It is also a fair source of carbohydrates, protein, vitamin-B group and calcium. Guava is best suitable for making jams, jelly, ready to serve beverage, canning and cheese. Guava cheese is one of the popular confectioneries of Indian Halwa. The fruit with a high moisture content faces the problem of storage, especially during seasons when a high yield is obtained. When the moisture content was reduced the fruits were found to have a longer shelf life. This is the basis for dehydration. One of the recent techniques is osmotic dehydration. Osmotic dehydration is the process of water removal by immersion of water containing cellular solid in a concentrated aqueous solution. The osmotically dried fruit can be either preserved for later use or directly consumed as a snack item.

To increase its storage life and utility without reducing any of the nutrients originally present, a study on the osmotic dehydration of guava was carried out in the laboratory with the following objectives. To study the acceptability of the changes in the chemical constituents by osmo dehydration process and to study the shelf life of osmo dried guava.

Materials and Methods

Materials

The present study was conducted in the Home Science College and Research Institute, Madurai, Tamil Nadu, India. The fully matured but greenish yellow in colour, with three fourth maturity of Lucknow-49 and Hafsi variety were used. The other miscellaneous items were purchased from the local market. Packaging materials like polyethylene bags of (12 × 16 cm) 100 gauge, (12 × 16cm) 200 gauge thickness were used.

Methods

Selected fruits were peeled and cut as cubes of 1.5 cm of thickness. Pretreatment was done for hardening and blanching. The fruit slices were immediately transferred into 5 percent calcium chloride solution for 15 minutes and blanched by steaming process for 3 minutes. Osmotic treatments are denoted below as T_1 – Guava slice with sugar solution, T_2 – Guava slice with salt solution T_3 – Guava slice with sugar + salt solution, T_4 – Guava slice with spices solution and T_5 – control.

The osmosis was given by immersing the weighed pretreated slices in different osmotic solutions in the ratio of 1:1 by weight. The slices were soaked in the syrup strength 60°brix for 12 hours and slices were dried in a cabinet drier at 65 to 70°C for 8 hours. The dehydrated guava slices were packed in above-mentioned polyethylene bag and sealed. The packed dehydrated slices were stored at room temperature for six months and chemical, and organoleptic changes were determined.

The chemical analysis was done once in thirty days for all the osmotically dehydrated fruit slices. The moisture, pH, acidity, vitamin C, reducing sugar, and total sugar were analysed as per the procedure in Ranganna (1995). The sensory evaluation was done (9 to 1 scale) with a panel of 10 untrained judges as per the procedure of (Watts ***et al.,*** 1989).

Results and discussions

Guava fruits were osmotically dried after treating them in sugar, salt, sugar + salt and spices solution. Chemical constituents like moisture, pH, acidity, reducing and total sugar, nutritive qualities such as vitamin-C were assessed. The organoleptic qualities were studied during six months of storage period. The results and discussions drawn from the data are presented in this study.

Moisture

The dehydrated guavas on storage were found to absorb moisture and the percent moisture values increased at the end of six months (S_1 to S_6). The highest absorption of moisture was observed in the sugar solution treated sample packed in 200-guage-bag ($V_2T_1P_2$). The lowest absorption of moisture was observed in the salt solution treated samples packed in 100-guage-bag ($V_1T_2P_1$). Mehta and Tomar (1980) found that the moisture content of the osmotically dehydrated guava slices and control slices did not differ much during storage.

Table 1. Changes of moisture, pH, acidity, reducing sugar and total sugar of osmotically dehydrated Guava on storage (percent) (DWB).

Particulars	Moisture (g%)		pH		Acidity (g%)		Reducing Sugar (g%)		Total sugar (g%)		Vit-c (g%)	
	S_1	S_6	S_1	S_6	S_1	S_6	S_1	S_6	S_1	S_6	S_1	S_6
V. T_1 P_1	10.15	11.15	4.50	3.83	0.360	0.416	1.54	2.85	21.70	20.50	137.40	49.30
P_2	10.42	11.50	4.55	3.86	0.340	0.414	1.56	2.55	22.95	22.08	140.75	47.65
V. T_2 P_1	10.15	11.35	4.60	4.01	0.330	0.395	2.64	2.66	9.66	8.74	120.20	54.95
P_2	10.70	11.25	4.32	3.80	0.325	0.405	2.30	2.65	9.95	8.46	122.40	46.70
V. T_3 P_1	9.50	11.50	4.48	3.96	0.325	0.405	1.46	3.62	23.57	21.48	122.30	49.75
P_2	10.55	11.70	4.54	4.03	0.315	0.395	1.56	3.22	22.42	21.75	110.65	54.54
V. T_4 P_1	10.25	11.55	4.47	3.96	0.370	0.415	0.31	1.65	22.11	21.52	128.70	42.50
P_2	10.15	11.50	4.44	3.97	0.355	0.415	0.34	1.69	22.79	21.23	126.15	42.75
V. T_5 P_1	10.30	11.72	4.42	3.94	0.350	0.415	1.01	2.42	10.29	8.54	126.25	43.82
P_2	10.75	11.77	4.48	3.95	0.335	0.405	1.07	2.30	9.55	7.92	128.05	49.25

V. = Lucknow -49 variety
P_1 = 100 gauge thickness
P_2 = 200 gauge thickness
S_1 = one month
S_2 = six month

T_1 – Sugar solution
T_2 – Salt solution
T_3 – Sugar + Salt solution
T_4 – Spices solution
T_5 – Control

Acidity

The acidity of osmotically dehydrated guavas was observed to increase over a period of six months (S_1 to S_6). The difference in acidity between the samples was very minimal. Generally decrease in acidity over the storage period was almost similar for all samples. Mehta ***et al.,*** (1982) Observed the acidity of fresh pineapple ring as 0.5 which increased to 0.7 percent in the osmosed ring. The result of the present investigation was found to be similar to the earlier studies conducted by the scientists using various fruits.

Reducing sugar

In general, there was an increase in reducing sugar over the storage period of six months (S_1 to S_6). The highest amount of

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Table 2. Changes of moisture, pH, acidity, reducing sugar and total sugar of osmotically dehydrated Guava on storage (percent) (DWB).

Particulars	Moisture (g%)		pH		Acidity (g%)		Reducing Sugar (g%)		Total sugar (g%)		Vit-c (g%)	
	S_1	S_6	S_1	S_6	S_1	S_6	S_1	S_6	S_1	S_6	S_1	S_6
V_2 T_1 P_1	10.30	11.65	4.40	3.95	0.315	0.410	1.50	2.50	22.89	21.84	127.50	47.90
P_2	10.72	11.75	4.51	4.05	0.325	0.385	1.22	2.65	22.86	21.83	136.70	50.10
V_2 T_2 P_1	9.30	11.60	4.34	3.77	0.340	0.410	1.59	2.29	8.87	7.85	127.15	34.35
P_2	10.10	11.55	4.55	4.10	0.345	0.410	1.58	2.22	9.42	8.71	119.20	35.65
V_2 T_3 P_1	10.10	11.55	4.35	3.83	0.315	0.395	1.33	3.57	22.84	22.30	145.50	55.35
P_2	10.20	11.75	4.28	3.77	0.335	0.400	1.42	3.97	22.73	22.15	121.75	48.55
V_2 T_4 P_1	10.50	11.65	4.61	4.09	0.385	0.415	1.27	4.04	22.70	22.30	125.25	53.65
P_2	10.60	11.35	4.57	4.01	0.365	0.415	1.13	4.18	22.75	22.28	125.25	44.35
V_2 T_5 P_1	10.54	11.70	4.42	3.93	0.355	0.415	1.16	2.43	10.26	9.22	107.75	47.60
P_2	10.40	11.55	4.49	3.93	0.380	0.420	1.44	2.40	9.82	9.43	114.35	52.35

V_2 = Hafsi variety
P_1 = 100 gauge thickness
P_2 = 200 gauge thickness
S_1 = one month
S_6 = six month

T_1 – Sugar solution
T_2 – Salt solution
T_3 – Sugar + Salt solution
T_4 – Spices solution
T_5 – Control

reducing sugar content was observed in P_1 (100 guage) in salt solution (T_2) treated sample (2.64g percent) in Lucknow-49 variety (V_1) which increased to 2.66g percent at the end of storage period. Mehta and Tomar (1980) showed that there was not much variation in reducing sugar content during storage of dehydrated muskmelon slices. In control slices, the initial level was 13-26 and after 6 months it was 18.62g percent. In osmotically dehydrated muskmelon slices the initial reducing sugar content was 22.08g percent only. Similar trend was noted in the present study.

pH

The pH of osmotically dehydrated guavas decreased during the storage period (S_1 to S_6). Negligible difference was found in pH between the Control samples and the other treated samples. The maximum decrease was observed initially in the case of the sugar + salt treated sample (P_2T_3) for Hafsi variety.

Total sugar

The initial total sugar content of the samples was observed to decrease by the end of six months (S_6), as in the case of $V_1T_1P_2$ which decreased from 22.95 to 22.08g percent. Control samples were also found to have relatively lower sugar content when compared to the other treated samples.

Ascorbic acid

The ascorbic acid content was found to drastically decrease at the end of six months. The control samples had an ascorbic acid content of 126.25 mg percent, whereas in the other treated samples, the values were 122.40 and 140.75 mg percent in $V_1T_2P_2$ (salt) and in $V_1T_1P_2$ (sugar) for Lucknow-49 variety. Ramamurthy ***et al.,*** (1978) found that 46.52 and 60 percent loss of ascorbic acid occurred during 6 and 12 months of storage of osmotically dehydrated mango slices.

Organoleptic qualities of osmo dehydrated guavas

The overall organoleptic evaluation score given by a panel of judges revealed that among the four treated samples stored upto six months, the spices treated sample (T_4) scored maximum values in Lucknow-49 (V_1) variety which had the best appearance, colour, texture, and flavour than Hafsi (V_2) variety.

Summary

Guava fruit with its high moisture content faces storage problems during seasons. To increase its high shelf life osmotic dehydration was carried out where sliced guava were treated with sugar, salt, salt + sugar and spices solutions. The osmosed guavas were dehydrated and packed in polyethylene bags (100 and 200 guage thickness). The yield of dehydrated products was more in the spices treated samples for Lucknow-49 variety. The chemical constituents like moisture, acidity and reducing sugar content were found to increase, and pH, total sugar, Vitamin-C content were found to decrease when stored for six months. The spices treated guava was the best among the all the treatments.

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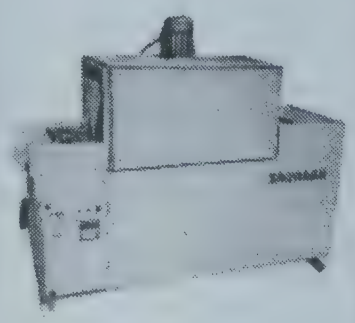

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Utilization of Chhana Whey - a Review

by
Geeta Chauhan, P. L. Yadav and S. K. Mendiratta

Milk, because of its high nutritive value is considered as complete food for infants and a rich food supplement for adults. It contains easily digestible, high biological value protein, fat-soluble vitamins, B-vitamins, and is an excellent source of calcium (Rajalakshmi, 1984). Table 1 depicts the amount of important nutrients in various milks as given by Venkatachalan and Rebello (1994). As far as sufficient consumption of milk is considered atleast 150 ml should be included in an adult diet and children, pregnant and lactating women should take atleast 250 ml of milk daily for proper nutrition (Gopalan ***et al.,*** 1989). This may be consumed not only as whole but in the form of various products also. India is producing 75 million tonnes milk (more than U.S. production-74 million tonnes) and is on the first position in milk production (Kumar, 1999). Yadav, ***et al.,*** (1989) reported that of the total milk produced, approximate half is used in making indigenous milk products. It is used in the form of many products as coagulated milk products like paneer, chhana and chhana based sweets, concentrated milk products as khoa and khoa based sweets, fermented products as curd and shrikhand and clarified butter fat products like makkhan and ghee etc. (Sangwan and Sharma, 1984). Preparation of these products lead to many byproducts, like whey in the manufacture of coagulated milk products but due to lack of technology these by-products go waste. Singh ***et al.,*** (1985) have mentioned that most of the whey from milk plants and halwais is wasted except the very little amount used for milk coagulation for preparation of coagulated milk products. The same happens with chhana whey also. De (1976) has reported that chhana is produced by acid coagulation of boiled milk and then separating the whey. Here we are discussing about the utility of this separated Chana Whey. In our country about 12 lakh tonnes of chhana is prepared per year as reported by Aneja (1997), yielding the whey about 8 million tonnes. On the other hand Channa whey has got very good nutritive value. An earlier study by De and Som in 1948 depicted that utilization of whey calcium is 80-90% in rats and humans. 137 mg extra calcium can be added to the diet by including 200 ml whey. Hence inclusion of the Chhana whey in our diet can improve its nutritive value. Nutritional composition of chhana whey is given in Table 2. Yalcin ***et al.,*** (1993) has also worked on nutritive value of chhana whey. Jindal and Grandison (1992) and Rao and Salooja (1990) described this whey as a nutritive pollutant as it contains about 6% milk solids and most of the whey is wasted which may lead to the problems of pollution. They suggested the processes like ultrafiltration, reverse osmosis, fermentation etc. by which this can be improved to valuable material. Electrophoretic studies by Jindal ***et al.***, (1993) revealed that major of the chhana proteins is denatured and chhana whey differs in protein composition from paneer whey. No qualitative changes in protein composition have been reported after storage at 70°C for 10 h.

Table 1: Nutrients content of various milks (per 100 g)

	Calories (Kcal.)	Protein (g)	Fat (g)	Carbohydrates(g)	Calcium (mg)
Human Milk	71	1.2	3.8	7.0	33
Cow's Milk	69	3.3	3.7	4.8	125
Buffalo's Milk	102	3.8	7.5	4.9	200
Goat's Milk	71	3.3	4.5	4.4	130
Sheep's Milk	108	5.6	7.5	4.4	200

Venkatachalan and Rebello (1994)

Division of Livestock Products Technology, Indian Veterinary Research Institute, Izatnagar, Bareilly 243122, U.P.

Table 2: Nutritional composition of chhana whey (per 100g)

*Singh and Mathur (1973) Jayaprakash **et. al.,** (1985)*

Energy	26.7 (Kcal)
Moisture	93.62 g
Protein	0.39 g
Fat	0.51 g
Lactose	5.05 g
Total solids	6.37 g

In view of the above facts present paper is intended to review information available on utilization of chhana whey to prepare valuable and useful products.

Preparation of whey beverages

Limited studies are available on the utilization of chhana whey. Singh and Singh (1976) suggested that channa whey is rich in vitamins and minerals. Products such as sherbet, fermented drinks (bacterial or yeast fermented) can be prepared from chhana whey. *L. Bacillus bulgaricus, L. acidophilus, streptococcus thermophilus* are bacteria and *Saccharomyces crevisiae, S. fragilis, S. lactis and Candida pseudotropicals* are yeasts, which may be used for fermentation purpose. Waghmare and Zanjad (1988) have reported method for the preparation of whey beverages as shown in flow diagram in Fig. 1. Hydrolysis of lactose of whey and culturing of hydrolyzed whey can produce a good refreshing drink. Maxilact, which is a lactase from *S. lactis* may be used for lactose hydrolysing (Kar ***et al.,*** 1997). Beverages of high nutritive value may be prepared with the mixture of chhana whey and fruit juices. Yalcin ***et al.,*** (1994) tried beverage preparation by mixing chhana whey with fruit juices such as orange (15-30%), pineapple (20%) and mango (20%) juice, sugar (0-8%), water and a stabilizer and found the mixture with mango juice organoleptically most acceptable. 4% sugar addition has been suggested, and to avoid fat separation, centrifugation of the whey was recommended. In the same context Ravikrishana, ***et al.,*** (1994) recommended that unhydrolyzed and lactose hydrolyzed deproteinized chhana whey mixed with fruit juices in the ratio of 70:30 (hydrolyzed whey: orange or pineapple and 10% sugar) or 60:40 (unhydrolyzed whey : orange juice and 14% sugar) can provide whey beverages which can be kept for one month at room temperature after sterilization. Mandal ***et al.,*** (1997) reported the preparation of beverage from chhana whey with the use of deproteinized chhana whey, citric acid, sugar and lemon juice. Sorbic acid as effective preservative and shelf life of 35 days (at room temperature) has also been reported. Kar and Misra (1998) worked to produce alcohol from concentrated, deproteinized chhana whey with the use of *kluyveromyces marxianus* subsp. Marxianus NRRLY-2415 and succeeded in producing 6.6% (V/V) alcohol (according to BIS specifications) from concentrated chhana whey having 12.72% lactose.

Fig. 1: Fermented Soft Beverage preparation from Chhana Whey

*Culture the chhana whey
↓
*Add sugar
↓
Heat treatment
↓
Hold at 8°C (72h)

***Best combinations:**
0.5% acidity with 13% sugar
0.6% acidity with 14 % sugar

Waghmare and Zanjad (1988)

Chhana whey powders

Chhana whey can be converted into powder for various uses. Chhana whey powder preparation using the techniques of membrane processing has been described by Jindal and Grandison (1992). Grandison ***et al.,*** (1994) and Jindal and Grandison (1994) compared the properties of chhana whey protein powder (prepared by ultrafiltration and reverse osmosis and then drying) with commercial cheese whey protein powder and concluded that protein solubility of chhana whey protein powder ranges from 57-100% and emulsifying properties of both powders remain similar when protein content is same. This leaves a wide scope for the use of these in food industry.

Nutritious foods

Process of high nutritive value (PER 2.9) whey cereal mix food preparation has been reported by Chandrapakash (1980). For this, first of all, the chhana whey is concentrated following vacuum condensing. It is concentrated to raise its total solids, protein and lactose content upto 60%, 6.2% and 45% respectively. Mix food is prepared by using 35% whey solids, 40% cereal flour and 20% sugar. This whey cereal mix food with sufficient amount of carbohydrate, protein and minerals was observed to have a storage life of thirty days at room temperature. Padmanabha ***et al.,*** (1987) have prepared organoleptically acceptable ice cream mixes by replacing 15 and 25% of milk SNF by chhana whey. A study by Vaghella ***et al.,*** (1992) explores the possible use of chhana whey as cooking medium for rasogolla and recommendation was made to use unneutralized chhana whey with 50% sugar (w/w) for this purpose.

Other uses

Badami (1952) reported a procedure which involves refining of crude lactose by activated charcoal to prepare lactose from chhana whey. The method is suitable for small scale and rural conditions. Chhana whey is also used to prepare coagulated milk products. Chhana prepared by using chhana whey as coagulant is hard and granular with slight sourness while citric acid use provides soft and smooth chhana without sour taste as reported by Singh and Ray (1977).

Conclusion

Chhana is a nutritious coagulated milk product, preparation of which leaves behind the whey of high nutritive value. If it is used to prepare value added products, its nutritional significance can be exploited and it may prove its economic importance. Development of nutritious and organoleptically acceptable products from chhana whey, use of chhana whey in preparing baking products, and therapeutic products etc. may be some important line of work.

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Appropriate Method for Aseptic Packaging of Commercially Sterilized Vegetables

by
S.G. Patwardhan

Abstract

The author has proposed the use of sterile chamber based on the flow of sterile carbon dioxide and fabricated as per his earlier communication. Vegetables filled in OTS can were covered with manifold paper and steam sterilized in autoclave. After taking out of the autoclave the cans were passed inside the sterile chamber by using the hand gloves of the sterile chamber. The paper covers were removed inside the chamber. The vegetables were then poured in the gamma-sterilized laminated pouches and heat-sealed inside the chamber. The pouches were opened and vegetables tasted after incubation. In another experiment the steam processed vegetables in paper covered cans were passed inside the chamber, covers removed and vegetables transferred into sterile nutrient media to check the efficacy of prevention of aerial contamination by the paper. Reference has been quoted about the successful use of the chamber in aseptic packaging of Coccinia Indica. It has been concluded that small-scale aseptic packaging is possible. Two figures are given showing the chamber and the position of hand gloves useful in the operation.

Introduction

The need for the development of an appropriate aseptic packaging was recently stressed by J. Hari Narayan, Jt. Secretary, Ministry of Food Processing, on Nov. 11th, 1999 at the Food Processing Seminar at Mysore. These small units can provide job opportunities to rural youths and at the same time preserve the surplus of fruits and vegetables. Mechanization of the process based on the new technique described in this paper will go a long way in the development of a semi continuous aseptic packing process and might prove to be a boon to the developing world. A review on aseptic packaging of food products has been published (Patwardhan, 1999) and a research paper about successful fabrication of sterile chamber for aseptic packaging (Patwardhan, 1999) has been communicated for publication. Using the chamber is a new technique and is considered here namely for use of manifold paper for covering the filled cans and steam sterilization of such can holding products. After removal of can outside the autoclave the paper was intended to ward off the contamination till the can was passed inside the low cost sterile chamber for aseptic packaging. Experiments were carried out to check the success of the aseptic transfer of the sterility media and commercially sterilized vegetables into pre-sterilized pouches under cover of sterile flow of carbon dioxide.

Materials and Methods

Low cost easy to fabricate sterile chamber for aseptic packing referred to in the introduction, A1 American autoclave of 21 litres capacity with metal to metal joint with lid, Kipps' apparatus, Impulse sealer, Formalin (37-41% W/V LR) Methanol; HPLC grade Glacial acetic acid extra pure, Citric acid extra-pure Precipitated calcium carbonate, nutrient broth and sterility media M017, M018, M013 from High Media, Bittergourd, Drumstick and Tondli (Coccinia Indica). Manifold paper, aluminium foil laminate of 15 micron polyester, 12 micron foil and 150 gauge LDPE, scissors, metal tongs, vertical laminar flow equipment of Micro Med India.

Experiment 1-Tondli [Coccinia Indica] was aseptically pouch packed using the novel method, referred to in the introduction, and microbiological studies carried out to study the safety and also acceptability. The results have been published [Patwardhan, 1999].

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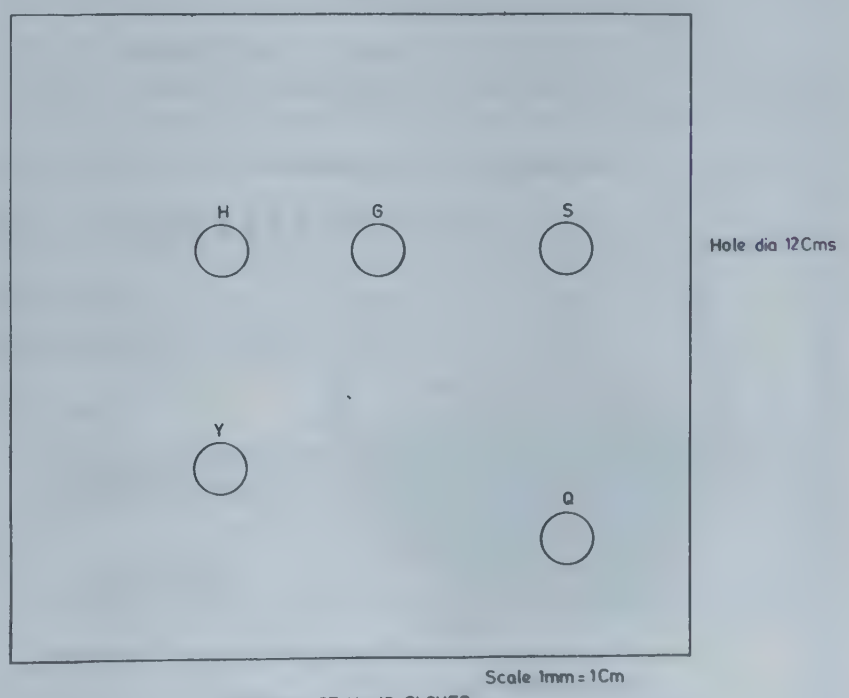
Experiment 2- Two other vegetables namely drumstick and bittergourd were studied. The cleaned vegetables were cut into slices of drumstick 8.5 cm and bittergourd 3.0 cm [average]; placed 250 gm in A2½ [801x811] size cans ad covered with 5 layers of manifold paper, tied with twine. Eight such cans of each vegetable were then autoclaved in three batches at 10 lb steam pressure for 10 minutes. Thus total number of 24 cans of each were processed. After the pressure dropped to 2 lbs; the autoclave was opened and the cans with porous cover were transferred from bottom of the chamber. One worker was using the upper two hand gloves H and G the other worker passed the porous covered cans from the bottom of the chamber using the lower hand glove Y to the first worker to place on the table (Figure 1 and 2). External handling was by sterile metal tongs.

6 pouches were sealed in a polythene bag and then irradiation carried out. Pouches were given to BARC for sterilization using 2.5 KGY irradiation. The irradiated polythene bag was externally sterilized by methanol and passed inside the chamber like the porous covered cans using the hand gloves of the chamber. The polythene bag was cut opened by sterile scissors inside the chamber and the pouches of 22cm x 22cm were taken out, the porous cover of the cans removed and the vegetable pieces emptied into the pouches one at a time. Since only carbon dioxide is present in the chamber, the vegetable got covered with carbon dioxide only. The pouches were then heat sealed, the first worker placing the pouch in the sealer jaw gloves G and S, the second worker pressing the lower paddle of the sealer using lower hand gloves Q. Ten such pouches of each vegetable were incubated at 37°C and 55°C for one month each.

Experiment 3- In another experiment sterility medium A, B and fluid sabouraud medium M013 of HiMedia were prepared and distributed 20 ml each in 24 flasks of 250 ml in two sets. They were then cotton plugged and sterilized at 15lb steam pressure for 20 minutes.

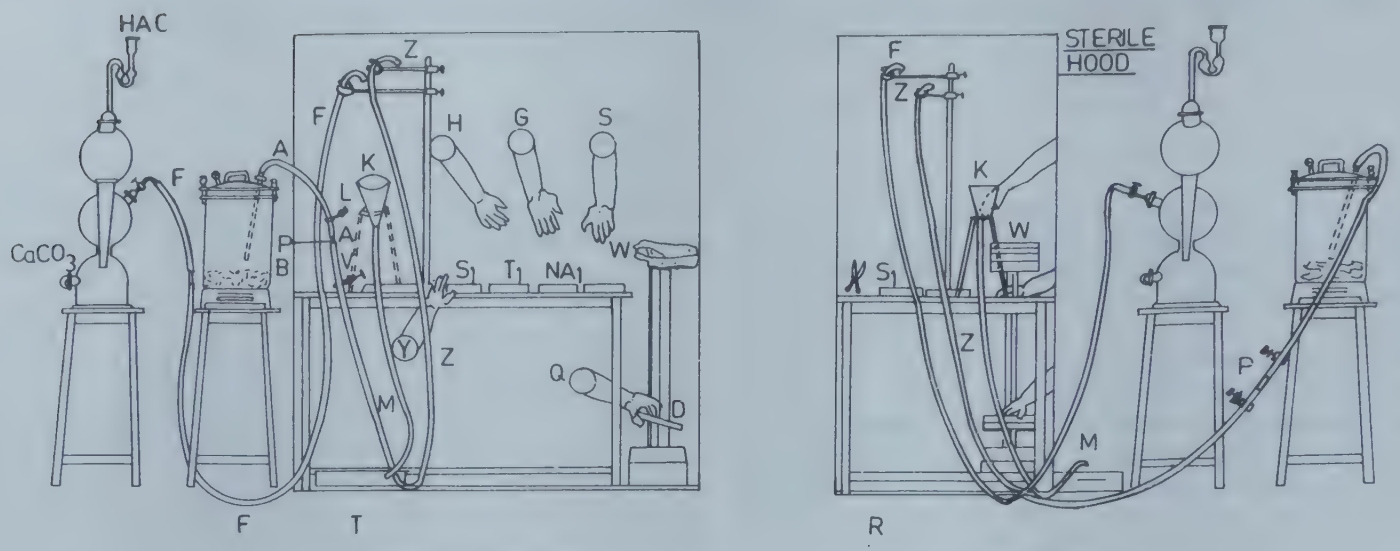
Bittergourd and Drumstick was cut into very small pieces of

Figure-1



LOW COST, EASY TO FABRICATE STERILE CHAMBER/HOOD FOR ASCEPTIC PACKAGING

Figure-2



about 1cms. They were placed in 4A 2½ cans; covered with manifold paper. Two cans one of each vegetable were kept uncovered as control. Similarly nutrient broth was placed in two A2½ cans. All the 8 cans were processed at 10 lb steam pressure for 10 minutes. The covered cans were transferred to laminar flow cabinet. After removing the porous cover the vegetable pieces as well as nutrient both were transferred in the laminar flow cabinet to 3 sterility testing media in 20 flasks of each vegetable. In two flasks nutrient broth was added. In two flasks vegetables from uncovered cans were added. The transfer was carried out in laminar flow cabinet. The flasks were then incubated at 30°C for 7 days.

Results and Discussion

The results of the experiment 1 indicated that the new technique is suitable for packing of vegetable [Tondli] in flexible pouches for long shelf life. It is cheaper than retort pouch. Packing of vegetables in small scale processing is amenable to this process. The paper on Tondli concludes that the process is advantageous in saving costs on energy and packing as well as on improvement of the quality of the vegetables.

The incubated pouches from experiment 2 were opened and tasted by 5 regional centre staff members. They were found to be acceptable i.e. firm with slightly cooked characteristic flavor and color.

The flasks from experiment 3 were observed after incubation. No trace of growth was noticed in any flasks. Visible fermentation was noticed in the flasks where vegetable cans were processed uncovered. This experiment confirms that the porous cover namely manifold paper prevent entry of microbes from air to the enclosed media/food.

The logical explanation for acceptability is that since the severity of the thermal process in the novel method [10 lb for 10 minutes] is lesser or equivalent to the traditionally processed canned food, the food has to be acceptable.

Conclusion

It can be concluded that the porous cover namely manifold paper prevents the entry of microbes from air to the enclosed media/food. The appropriate method for aseptic packaging/modified process developed using manifold paper covering can be used by small scale industry for pouching vegetables and can be marketed as a long life product. The process uses indigenously manufactured laminate for preparation of pouches, uses all indigenous raw materials; is likely to generate employment. It substitutes imported tin plate. The transportation of the packed product as well as opening of the container by the consumer is likely to be much more convenient than canned products.

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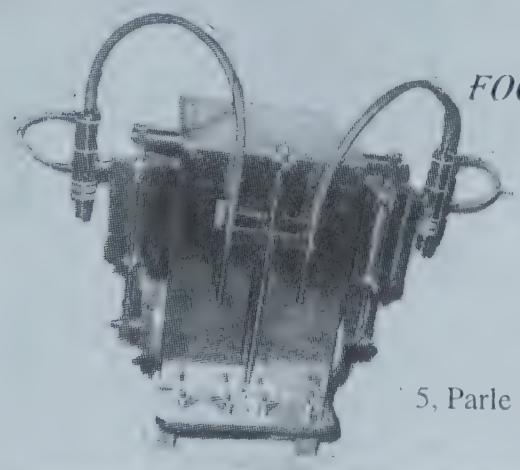
Volumetric Filler



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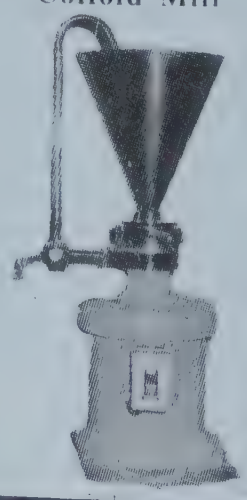

Milk and Health Today

by
J.M. Jandal

Abstract

Milk and milk products play a beneficial role in specific health care. It prevents risk factors in cancer, athletes, obesity, hospital diet, diabetes, hyper-tension, osteoporosis, growth factors, milk allergy, hyper and hypo-cholesterolemic effect, and cardiovascular diseases.

Introduction

Milk has long been recognised as the most comprising wholesome and complete single food available in nature for health and as a medicine (Mathur ***et al.,*** 2000). It is required by all newborn mammals. Nature has provided it with many vital constituents like fats, proteins, carbohydrates, vitamins and minerals. Its composition varies from species to species as per requirement of their off spring. Apart from the requirements of new-born ones, milk also provides nutrition to elderly people. Human is the only one who drinks it throughout his life span. Milk provides excellent support towards human nutrition, as it contains balanced quantities of required nutrients such as protein, lactose, fats, minerals and vitamins (Mathur ***et al.,*** 2000).

Recent advancement in science has resulted in exploitation of several virtues of milk and its products. Today, milk constituents individually and collectively find several applications in our lives. A more recent application is cancer-treatment (Oncology).

The purpose of this paper deals with the situation of milk and milk products in nutrition, growing, athletes, nursing, cancer, obesity, hypertension, coronary heart diseases, osteoporosis.

Milk and its Products in Nutrition

Milk is recommended in human nutrition, a minimum 300gm daily intake of milk is recommended for children between 1-3 years, 250 gm for those between 10-12 years and 200-250gm for those children, who do not derive nutrients from animal sources (Sharma ***et al.,*** 1999). Milk and its products supply one seventh of our energy intake, one quarter of the protein eaten, one fifth of fat, one quarter of the saturated fats, but over half the calcium, over a third of the vitamin B_2 and a fifth of our intake of vitamins (Buttris, 1987). There are recommendations to reduce fats, cholesterol, minerals, lactose in our diet by decreasing the consumption of dairy products containing these components to reduce the incidence of various chronic degenerative diseases such as coronary heart diseases, cancer, osteoporosis, obesity, diabetes (Speckman ***et al.,*** 1981). During recent years, nutrition research was concerned on application of nutrition to control biological systems in diseases (White, 1979; Leveille ***et al.,*** 1979) has focused on prevention of mitigation and cure of chronic and degenerative diseases. Nutritional benefits of milk and its products are not confined to growing and adolescene, but are important for all ages during infancy, adulthood, pregnancy, lactation and later years (Brink and Lofgren, 1982; Leveille 1978; NDC, 1977; Phillips and Brigs, 1975).

Milk proteins consist of almost all types of amino acids including essential ones. Hence milk proteins have a very high net protein utilization value of 83 percent. Whey proteins possess high level of sulphur containing amino acids, especially alpha-lactalbumin and are easily digestible, high quality and relatively inexpensive. These find use in dietetic food formulation for patients suffering from diseases like phenylketonuria, tyrosinemia, and hyperphenyl alaninemia. These proteins have the capacity to associate with vitamins like folate binding protein which facilitates the transfer of these vitamins to different tissues of the body (Sharma ***et al.,*** 1999). Milk fat also provides the body with essential fatty acids like linoleic acid (C18:2), Linol-enic acid (C18:3) and arachidonic acid (C20:4) which are not synthesized in the body. These are important for the proper functioning of cell walls and membranes. Lactose, apart from providing energy, inhibits putrefaction by promoting the growth of aciduric bacteria in the intestine which reduces the intestinal pH and facilitates the absorption of calcium, magnesium, zinc and phosphorous. Calactose, apart from lactose, has a role in early development of the infant brain and spinal coloumn besides N-acetyl glucosamine. Fructose and N-acetyl neuraminic acid have physiological significance and acts as bifidus factor (Sharma ***et al.,*** 1999).

Cancer

Low fat milk and milk products mat reduce the risk of certain types of cancers and helps in weight control (Jacob, 1993). Free fatty acids and bile acids damage intestinal mucosal cells, increase rate of epithetical cell proliferation which is a precursor of cancer and enhance carcinogenesis by acting as tumor promoters (Ganguli, 1996). Whey proteins also have a protective effect on colon cancer development by enhancing glutathione tissue level, because whey proteins are rich in substrates for glutathione synthesis. Glutathione is also able to suppress tumor growth at various sites (Peter 1998). Free fatty acids might also play a role against lung cancer (Ganguli, 1996). Recker ***et al.,*** (1984) suggested that calcium blocks the tumor promoting effects of fat by chelatting in conjugatial bile

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acids/or free ionized FFA in the colonic lumen to form relatively insoluble calcium complexes. Barbone and Partridge (1993) found that woman who consumed more dairy products like skim milk, yoghurt, sour cream, and cheese were at significantly less risk of developing enclonretrial cancer than women whose diets were less in dairy foods. Much work is required in this field.

Athletes
The important role of milk proteins in the diet for athletes is discussed by Mann (1987) who gives details of the levels of amino acids in milk and biological value of milk proteins.

Obesity
It is recognised as a major public health problem in the world. Whole milk and cheeses have been claimed to be fattening (Speckman ***et al.***, 1981). Excess energy from any source of fats, lactose, and proteins can be metabolised to produce body fat (Ason, 1979). Excess weight increases triglycerides and lowers high density lipoproteins and also increases very low density lipoproteins (Patel and Renz Schauen, 1999).

Hospital diet
Patients suffering from liver and gall bladder disease hyperlipidaemia are advised to take diet rich in milk protein, but patients with impaired kidney function can rely upon proteins with high biological value such as milk protein. Patients suffering with gastric hyperacidity are treated with milk and milk products (Rao, 1994).

Diabetes
There are two distinctly different types of diabetes. The type that might have some relation to cow's milk is typel diabetes, the other is the severe insulin-dependent type of diabetes that usually begins in childhood or young adulthood. Several reports on lactose-reduced or lactose free milk and milk products suitable for person suffering from diabates or lactose intolerance in which fructose or aspartame are used to replace lactose (Mann, 1987). Diabetes in children could be prevented through strict avoidance of exposure to cow milk protein during at least the first six months of life (Ganguli, 1996). Diabetes accelerates the development of atheriosclerosis which increases the risk for heart attack, stroke and reduced blood circulation to feet (Patel ***et al.***, 1998).

Hypertension
Dairy products are recommended in our nutrition, because they provide other minerals such as vitamin K, and Mg which protects against hypertension. Increasing dairy products intake can lower their blood pressure due to abnormalities in Calcium metabolism including decreased serum ionized calcium, higher intracellular, calcium levels in erythrocytes, platelets and lymphocytes, increased para thyroid hormone, and increased urinary calcium excretion (Kansal, 1998). Calcium may also help to prevent high blood pressure by relaxing smooth muscle cells which line the blood vessels and decreasing smooth muscle hypertrophy and increasing production and endothelial relaxing factor (Miller and Graziak, 1997). By damaging the walls of the arteries, high blood pressure can accelerate the development of atherosclerosis. High blood pressure can increase low density lipoprotein and triglyceride levels and decrease high density lipoprotein (DCD, 1998).

Osteoporosis
It is characterized by reduced bone density resulting in increased bone fragility and susceptibility to fracture (Flynn, 1992). It is a multifactorial disorder due to inadequate calcium intake throughout early life. Milk is the single most important source of calcium. It is required throughout life for the development and maintenance of strong bones and teeth (Buttris, 1987). The importance of calcium in maintaining body functions in 500 gm per day for adult, 100mg for children and 1200 mg/ day for pregnant and lactating women. Over half of calcium comes from milk, cheese and yoghurt (Buttris, 1987).

Growth factors
Milk also contains some insulin like growth factor, such as fibroblast growth factors and platelet derived growth factors. Peptide growth factors which can stimulate and inhibit proliferation in several types of cells (Patel ***et al.,*** 1998). Whey might have found a dairy-based weapon in the battle against the potentially deadly disease.

Milk allergy
Both proteins and lactose components of milk can be the cause of intolerance. Lactose intolerance is due to failure of the epithelium of the small intestine to produce lactose. The potential problem of lactose intolerance was low levels of lactose enzyme (Lactase) in the digestive tract (Bayless and Roensweig, 1966). This intolerance, either of primary or secondary origin leads to several forms of gastroenteritis, manifesting, vomitting, nausea, loose stool, infeeding of milk and milk products having high level of lactose (Paul and Mathur, 1987). Person suffering from lactose intolerance are not able to digest completely the lactose (Katz, 1981; Torum ***et al.,*** 1979).

Milk protein allergy may be considered to be another form of milk intolerance. Allergic reaction may occur in a few infants in early life (Foman, 1974; Lee and Lorenz, 1979; NDC 1980).

Hyper and hypo cholesterolemic effect
Milk actually has hypo cholesterolemic effect both in human (Mann, 1977) and for dahi and acidophilus milk in rats (Chawla and Kansal, 1984) and for skim milk in animals (Kritchevskey ***et al.,*** 1979; Srinivasan and Kansal, 1986), and whole milk in human (Howard and Marks, 1977) and experimental animals (Chawla and Kansal, 1984; Srinivasan and Kansal, 1986, 1988).

Milk fat is believed to act as hyper cholesterolamic effect since it contains cholesterol. Milk and milk products contribute to blood cholesterol (Pruth and Bindal, 1996; Ney 1991). The presence of crotic acid and cholina and myo-inos-ol present in bovine milk active in reducing cholesterol biosynthesis (Ahmed ***et al.,*** 1970; Papa ***et al.,*** 1982; Barnstain ***et al.,*** 1976). Marks and Howard (1977) suggested that lactose also contributed towards hypocholesterolemic effect of milk. Calcium is another factor present in milk for its hypo-cholesterolemic effect (Howard, 1977). Milk, yoghurt or acidophilus milk have hypo-cholesterolemic effect in humans (Ganguli, 1996). The hypo-cholesterolemic effects of fermented milk is attributed to reduction of cholesterols in the blood and/or formation of hydroxy methyl glutamate which inhibits cholesterol synthesis formed as a result of biochemical activity of starter microbies (Mathur ***et al.,*** 2000).

Cardiovascular diseases
Milk is one of the factors responsible for the coronary heart disease (CHD). It is a condition in which the coronary arteries supplying blood are no longer able to supply sufficient blood to the heart muscle which may then quickly die (Sharma ***et al.,*** 1999). The main cause of reduced blood supply is accumulation of deposits in the lining of arteries, a disease known as arteriosclerosis. Milk may aggravate the problem because of its high level of saturated fatty acids and cholesterol which were blamed for arteriosclerosis. A heart attack (myocardial infarction) is caused by a blood clot forming and completely blocking the blood supply to the heart (Sharma ***et al.,*** 1999). Many factors influence the clotting of arteries, cholesterol is one important factor. Low fat diet reduces both, low density lipoprotein cholesterol and high density lipoprotein cholesterol (Curr, 1987; Kansal, 1990). Association between increased dietary intakes of cholesterol and saturated fatty acids activated serum cholesterol and increased risks of arteriosclerosis and CHD (Allred, 1992).

Milk and milk products play beneficial role in specific health care. It prevents risk factors in CHD, hypocholesterolemic effect, improves health, bone, teeth and offers protection in hypertension and osteoporosis. Furthermore, milk and milk prod-

ucts are significant sources of several nutritional aspects like proteins, lipids, lactose, minerals and vitamins. Part can contribute to raise blood cholesterol levels and thus to increase risk of heart diseases (Meister, 2000).

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SAKAV FOOD MACHINES

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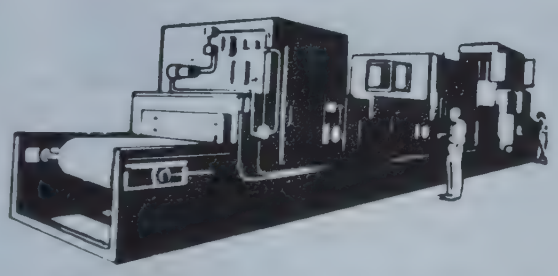

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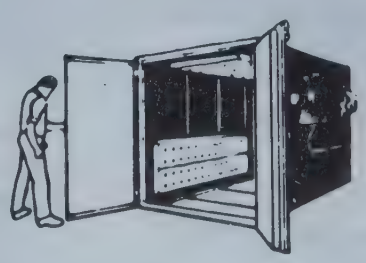

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Studies on Ready-to-serve (RTS) Beverage Based on Pomegranate and Mango

by
S.K. Nakadi, P.M. Kotecha and S.S. Kadam

Abstract

The pomegranate juice was blended with mango pulp for preparation of ready-to-serve (RTS) beverage. Water, cane sugar and citric acid were added to maintain 15° Brix TSS and 0.25 percent acidity. Mango pulp was added in various proportions for preparation of RTS beverage. Based on sensory properties of RTS beverage, pomegranate : mango (60:40) blend was superior than other combinations because it had good colour and appearance, flavour, taste and overall acceptability compared to others.

Introduction

During seasonal glut, the pomegranate fruit prices are fairly low and due to cracking problem, fruits need to be processed and preserved. Pomegranate can be processed into various products like juice, squash, syrup, jelly, wine, anar-rub and canned beverages (Adsule and Patil, 1995). However, the information on processing of pomegranate fruits for juice and ready-to-serve (RTS) beverage is scanty. Pomegranate flavour is delicate and it contains less amount of vitamin C. Therefore, juice needs to be blended with some other juice having strong flavour and high nutritional quality for consumer acceptance. The present investigation was, therefore, undertaken to utilize mango pulp to blend pomegranate juice to make it suitable for preparation of ready-to-serve beverage having consumer appeal.

Materials and Methods

Pomegranate fruits of Ganesh cultivar were obtained from Department of Horticulture of this University. The fruits of uniform size, colour and maturity were harvested. Mango pulp of Alphonso variety manufactured by Desai Bandhu at Pawas, Dist. Ratnagiri (M.S.) under the trade name 'Vijay' was used for the research work.

The pomegranate juice was extracted by squeezing the arils gently by pressing through two layers of clean muslin cloth. Various steps in preparation of RTS beverage from the clarified pomegranate juice and blend of mango pulp are outlined in Figure 1. The analysis of juice and RTS beverage for various chemical parameters was done according to standard A.O.A.C. (1975) procedures. The sensory evaluation of RTS beverage was carried out according to the method of Amerine ***et al.,*** (1973) by a panel of 7 judges on a 10 point score card.

Fig. 1. Flow Chart for preparation of ready-to-serve (RTS) beverage.

Mixing of juice + pulp (10%)
↓
Adjustment of TSS to 15° Brix and acidity to 0.25 percent
↓
Filling into 500 ml bottles
↓
Keep the bottles in refrigerator (Temp. 4±2°C)
↓
RTS beverage

Results and Discussion

Sensory evaluation of ready-to-serve (RTS) beverage

The pomegranate juice was the major constituent in making RTS beverage and mango pulp was used for blending to improve the colour, flavour and nutritional quality of the RTS beverage. The score for colour and appearance, flavour, taste, astringency and overall acceptability increased with the increased proportion of mango pulp in the blends upto 60:40 level (pomegranate : mango) and then decreased slightly for 50:50 level (Table 1). Begum ***et al.,*** (1983) tried pineapple and mango pulp mixture and found 25:75, 50:50 and 75:25 blends more acceptable. Kalra ***et al.,*** (1991) indicated that 25-33 percent papaya pulp could be incorporated in mango pulp without affecting the quality and acceptability of the mango beverage.

Table 1. Sensory evaluation of ready-to-serve (RTS) beverage prepared from blends of promegranate juice and mango pulp.

Proportion of juice (pomegranate : mango)	Characters*				
	Colour / appearance	Flavour	Taste	Astri-ngency	overall acceptability
100:0	5.25	4.00	4.25	5.00	4.63
90:10	7.25	7.25	6.00	6.25	6.69
80:20	7.50	7.75	7.25	6.75	7.31
70:30	8.00	8.13	7.50	7.25	7.72
60:40	8.50	8.50	8.75	8.00	8.44
50:50	8.25	8.25	7.75	7.25	7.88
Mean	7.46	7.31	6.92	6.75	7.11
S.E. ±	0.21	0.18	0.17	0.16	0.15
C.D. at 5%	0.63	0.55	0.50	0.49	0.46

Table 2. Chemical composition of ready-to-serve (RTS) beverage prepared from blends of pomegranate juices and mango pulp

Proportion of juice (°Brix)	Parameters						
	T.S.S.	pH	Acidity (%)	Reducing sugars (%)	Non-reducing Sugars (%)	Total Sugars (%)	Ascorbic acid
100:0	15.00	2.98	0.26	1.26	12.71	13.97	0.92
90:10	14.98	3.00	0.27	1.14	12.66	13.80	1.07
80:20	15.02	3.00	0.25	1.09	12.58	13.67	1.23
70:30	14.98	3.02	0.23	1.01	12.51	13.52	1.38
60:40	15.00	3.00	0.25	0.92	12.43	13.35	1.53
50:50	15.02	2.98	0.24	0.90	12.32	13.22	1.68

Chemical composition of RTS beverage

There was no change in TSS, pH and acidity but the ascorbic acid content in RTS beverage changed with the levels of pomegranate juice. As the level of pomegranate juice decreased and mango pulp increased, the ascorbic acid content increased proportionately (Table 2).

Considering both the chemical composition and organoleptic properties of RTS beverage prepared by various combinations of pomegranate juice and mango pulp, it may be concluded that a blend of 60:40 (pomegranate:mango) is highly suitable for the preparation of good quality RTS beverage. These results are, however, based on the laboratory scale study. Therefore, pilot plant studies are required before the process of RTS beverage making from pomegranate and mango is commercialised.

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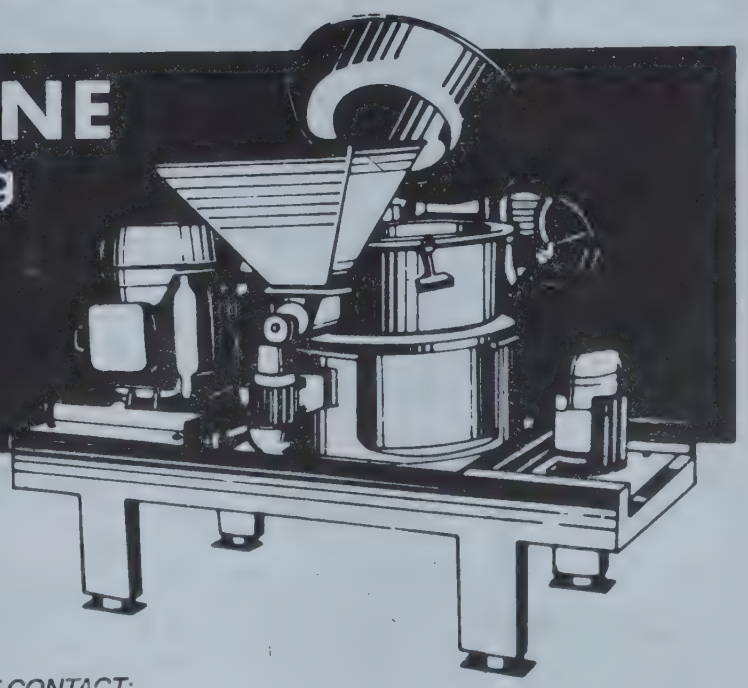

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Studies on the preparation and storage behaviour of sapota-papaya fruit bar

by
P.Vennila and A. Rose Prabin Kingsly

Abstract

Sapota-papaya fruit bar was prepared as per the FPO specification by blending the fruit pulp in different proportions. The standardized fruit bar (sapota-papaya 50:50) was kept at room temperature (30±5°C) for about three months to study their keeping quality. Storage studies showed that there was maximum retention of all the nutrients and minimum microbial count at the end of 180 days. Significant changes were not noticed in the organoleptic attributes and the fruit bar was found to be highly acceptable by the consumers.

Introduction

Ready-to-eat fruit bars are well established products and are being commercially prepared in India. Fruit bars were developed from mango, papaya, apple, guava, jamun and banana individually or in combination with different fruits (Mathur ***et al.,*** 1972 and Doreyappa Gowda ***et al.,*** 1995). Sapota and papaya are the most important tropical fruits in India. Sapota is a good source of sugar and minerals whereas papaya contains higher percentage of ß-carotene than other fruits (Veeraraghavathatham ***et al.,*** 1996). During the glut seasons, these fruits are available in plenty and cannot be stored for a longer period at ambient temperature. Hence the present study was undertaken to preserve the fruits and also avail the nutrients present in them by preparing fruit bar from the combination of sapota and papaya.

Preparation of fruit bar

Sapota-papaya fruit bar was prepared by taking the fruit pulp in different proportions viz., 100:0, 90:10, 80:20, 70:30, 60:40 and 50:50 and adding the other ingredients such as sugar - 250g, citric acid - 2.5g, corn flour-20g and kms 500 ppm for 1.0kg of pulp. The organoleptic scores of the prepared fruit bar is given in Table 1. Result showed that the sapota-papaya fruit bar combination 50:50 was ranked higher when compared to other combinations. The standardized fruit bar was taken for further indepth studies.

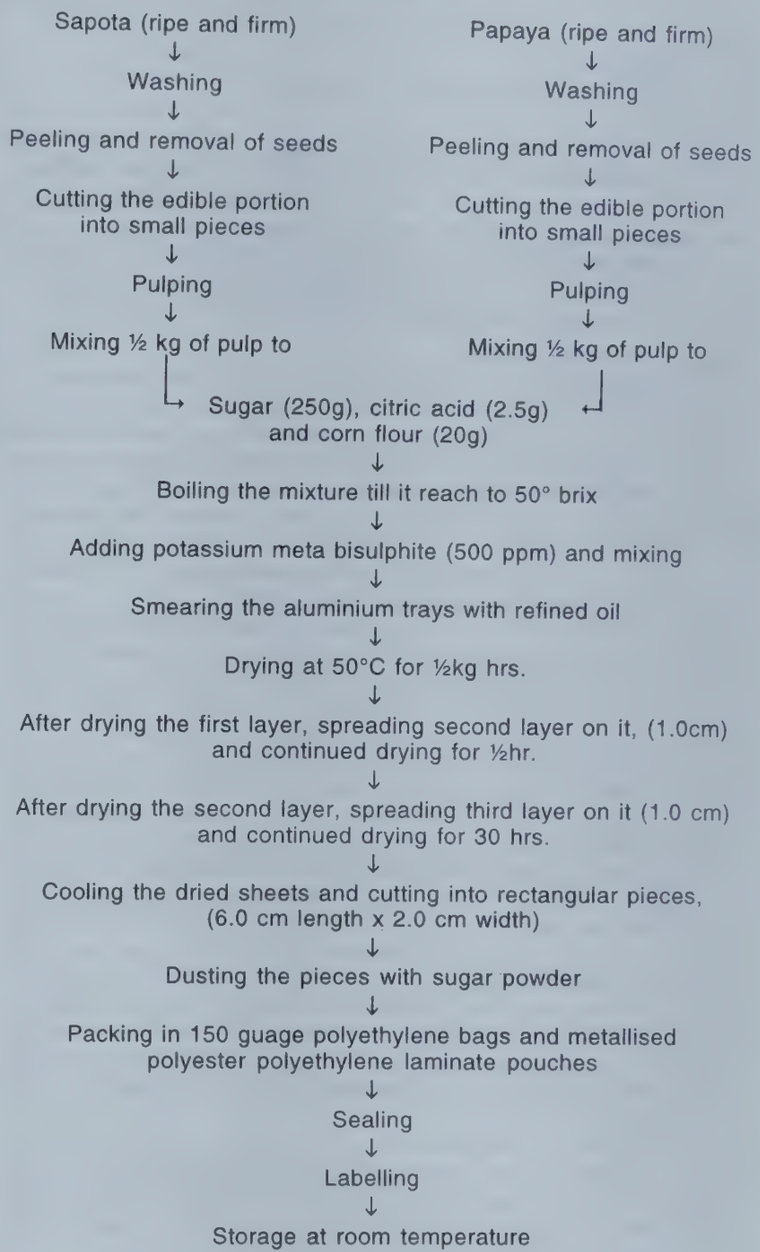
The standardized sapota-papaya fruit bar was prepared by mixing the pulp (sapota-500gm and papaya-500gm) with 250g sugar, 2.5g citric acid and 20g cornflour (Fig.1). The mixture was heated with continuous stirring till it reaches 50°brix. The boiled mass was cooled and 500 ppm of kms was mixed. This slurry was spread on trays (smeared with refined oil/glycerine) upto 1.0 cm thickness and dried in the cabinet drier at 50°C for ½ hr. After ½ hr, the second layer was spread over the first layer upto 2.0 cm thickness and continued drying for ½ hr. The third layer was spread over the second layer upto 3.0 cm thickness and could be continuously dried for about 20 hrs. The dried sheets were cooled and cut into rectangular pieces of size 6.0 cm x 2.5 cm (length x width). The cut pieces were rolled into the powdered sugar and packed individually in 150 gauge thickness polyethylene bags (PB) and polyester polythene laminate pouches (MPP). The packed materials were kept at room temperature (32±3°C) for storage studies upto a period of 180 days.

Table 1. Sensory scores of different combinations of sapota-papaya fruit bar

Parameter	T_0	T_1	T_2	T_3	T_4	T_5
Colour & appearance	57.5	60.0	67.5	70.0	80.0	82.5
Flavour	50.0	55.0	62.5	75.0	80.0	87.5
Texture	57.5	55.0	65.0	65.0	72.5	80.0
Taste	55.0	60.0	57.5	67.5	77.5	85.0
Overall acceptability	50.0	55.5	57.5	67.5	77.5	85.0

Sapota and Papaya pulp ratio
T_0 - 100:0, T_1 - 90:10
T_2 - 80:20, T_3 - 70:30
T_4 - 60:40, T_5 - 50:50

Fig. 1. Flow Chart for the preparation of sapota-papaya fruit bar


Sapota (ripe and firm)
Papaya (ripe and firm)
Washing
Peeling and removal of seeds
Cutting the edible portion into small pieces
Pulping
Mixing ½ kg of pulp to
Sugar (250g), citric acid (2.5g) and corn flour (20g)
Boiling the mixture till it reach to 50° brix
Adding potassium meta bisulphite (500 ppm) and mixing
Smearing the aluminium trays with refined oil
Drying at 50°C for ½kg hrs.
After drying the first layer, spreading second layer on it, (1.0cm) and continued drying for ½hr.
After drying the second layer, spreading third layer on it (1.0 cm) and continued drying for 30 hrs.
Cooling the dried sheets and cutting into rectangular pieces, (6.0 cm length x 2.0 cm width)
Dusting the pieces with sugar powder
Packing in 150 guage polyethylene bags and metallised polyester polyethylene laminate pouches
Sealing
Labelling
Storage at room temperature

Analysis

The stored samples were analysed at monthly intervals for

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Table 2. Changes in the chemical constituents of sapota-papaya fruit bar during storage (100 gm)

Storage period days	Moisture (g)		TSS° (bx)		Acidity (g)		pH		Total sugar (g)		Reducing sugar (g)		ß-carotene (g)	
	PB	MPP	PB	MPP	PB	MPP	PB	MPP	PB	MPP	PB	MPP	PB	MPP
0	16.60	16.60	80	80	0.405	0.405	4.65	4.65	60.93	60.93	7.59	7.59	605.18	605.18
30	16.35	16.45	80	80	0.407	0.407	4.65	4.65	60.85	60.85	8.00	8.03	600.53	602.08
60	16.26	16.29	80	80	0.407	0.407	4.60	4.61	59.00	59.06	8.81	8.94	598.58	599.33
90	16.15	16.20	78	79	0.415	0.417	4.57	4.59	58.34	58.59	9.45	9.57	594.37	595.14
120	16.01	16.14	78	79	0.419	0.422	4.54	4.56	58.04	58.14	9.93	10.18	590.89	592.76
150	15.60	15.85	78	79	0.427	0.431	4.39	4.43	57.28	57.56	10.58	10.93	587.15	590.10
180	15.18	15.64	78	79	0.440	0.448	4.15	4.21	56.44	56.85	11.09	11.48	585.76	588.36

Significant at 0.01 per cent levels
PB - Polyethylene Bags
MPP - Metallised polyester laminate pouches

moisture, TSS, acidity, total and reducing sugars as per the method described by Ranganna (1995), pH by the method outlined by Hart and Fisher (1971), ß-carotene by NIN procedure described by Mahadevan and Sridhar (1982).

Microbial load (bacteria, yeast and fungi) was determined by Istavan Kiss (1984) at monthly intervals. Sensory evaluation was done by ten untrained judges using 1-4 hedonic scale.

Results and discussion

The changes in the chemical constituents of stored sapota-papaya fruit bar is given in the Table 2. Moisture content of the samples decreased with storage period. The initial moisture content of sapota-papaya fruit bar was 16.60g/100g decreased to 15.18 and 15.64g/100g respectively in PB and MPP pouches. The TSS and pH of the fruit bar was also reduced to 2.5 and 10.75 per cent in PB and 1.25 and 9.46 per cent in MPP pouches respectively. Similar results were reported by Mathur ***et al.,*** (1972) and Krishnaveni ***et al.,*** (1999).

Acidity of the fruit bar was gradually decreased during storage in both the packaging materials. Kalsi and Dhawan (1998) reported that significant increase in reducing sugar, acidity, pectin and browning during storage of guava fruit bar. The total sugar and ß-carotene was decreased during storage. The maximum retention of ß-carotene was found in the sample stored at MPP pouches (97 per cent). Similar pattern of decreasing trend in mango bar during storage was reported by Mir and Mirankarnath (1993) and Doreyappa Gowda ***el al.,*** (1995). Gohilod ***et al.,*** (1982) and Sathyaprakash ***et al.,*** (1982) also noted the loss of total sugar and ß-carotene content of mango leather during storage. Reducing sugars exhibited an increasing trend in the bar samples during storage. Increasing trend in the reducing sugar content of mango bar was observed by Rao and Roy (1980) and Hemakar ***et al.,*** (2000). Statistical analysis of the data for acidity pH, total and reducing sugar and ß-carotene content of bar samples showed slight differences between the packaging materials throughout the storage period.

The microbial changes noted in the stored samples are presented in Table 3. The microbial counts of bars packed in PB and MPP packaging materials were nil initially and increased slightly during storage. Samples in MPP pouches showed minimum of microbial counts compared to samples in PB. In general the samples showed only a minimum microbial count at the end of 180 days of storage. This may be due to the addition of preservative (kms), percentage of sugar content and the heat treatment given to the sapota-papaya fruit bar. Similar results were reported by Krishnaveni ***et al.,*** (1999).

Table 3. Changes in the microbial population of sapota-papaya fruit bar during storage

Storage period (days)	Bacteria($x10^6$/g)		Fungi($x10^4$/g)		Yeast ($x10^5$/g)	
	PB	MPP	PB	MPP	PB	MPP
0	0	0	0	0	0	0
30	2	0	0	0	0	0
60	3	1	2	1	1	2
90	5	2	5	2	4	2
120	7	4	5	2	5	3
150	7	5	7	3	8	5
180	9	6	7	5	9	5

PB - Polyethylene bags
MPP - Metallised polyester polythene laminate pouches

The organoleptic evaluation of fruit bar is given in Table 4. Results showed that fruit bar packed in MPP pouches were most acceptable upto 120 days compared to PB bags. In respect of over all acceptability, the bars packed in MPP pouches were more acceptable (3.8) than PB bags (3.7).

Conclusions

The fruit bar prepared from the combination of sapota-papaya was found to be acceptable by the consumers even after storing for six months. The chemical constituents of the fruit bar did not exhibit high variations during the study period. The slight increase in the microbial population neither spoiled the fruit bar nor decreased the consumer acceptability. Among the packaging materials tried, the samples packed in MPP pouches showed minimum nutrient loss and also retained maximum consumer acceptability scores.

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Contd. on Page 42

Table 4. Organoleptic evaluation of sapota-papaya fruit bar during storage

Storage Period (days)	Colour		Flavour		Texture		Taste		Overall acceptability	
	PB	MPP	PB	MPP	PB	MPP	PB	MPP	PB	MPP
0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
30	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
60	4.0	4.0	3.8	4.0	4.0	4.0	4.0	4.0	3.9	4.0
90	3.8	3.9	3.8	4.0	4.0	4.0	4.0	4.0	3.9	4.0
120	3.8	3.9	3.8	4.0	4.0	4.0	4.0	4.0	3.8	3.9
150	3.7	3.9	3.7	3.9	3.8	4.0	3.9	4.0	3.8	3.9
180	3.7	3.8	3.7	3.8	3.8	4.0	3.9	4.0	3.7	3.8

PB - Polyethylene bags
MPP - Metallised polyester polythene laminate pouches

Effect of Stage of Fruit Maturity on the Quality of Pomegranate Wine

by
R.G. Bomble, P.M. Kotecha and S.S. Kadam

Abstract

An investigation was undertaken to find out the effect of stage of fruit maturity on the quality of wine from the juice of Ganesh cultivar of pomegranate. Considering the chemical composition and sensory properties of wine, the wines prepared from the fruits harvested 165 days after flowering, pH 3.5 and 5 percent inoculum were the optimum conditions for preparation of good quality pomegranate wine.

Introduction

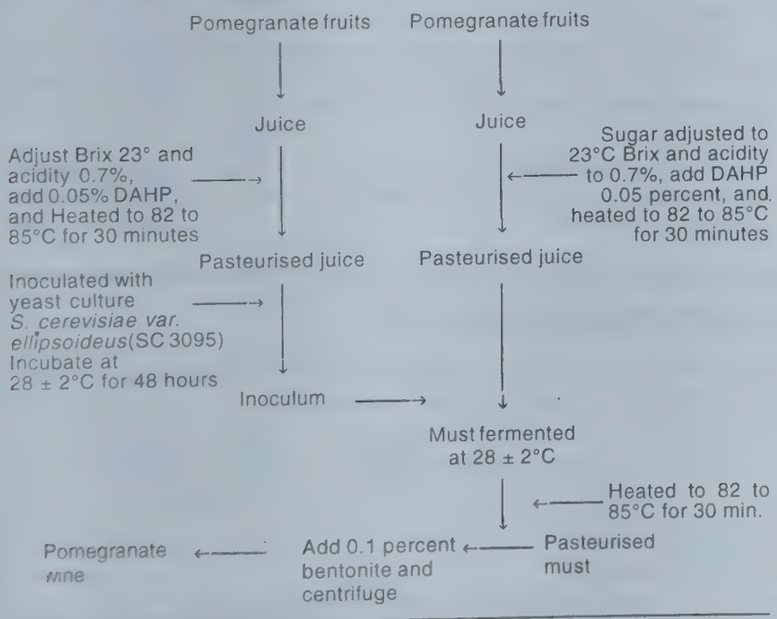
Pomegranate is a favourite fruit of tropical and subtropical regions of the world. It has better market price and good export potential. In recent years, the area under pomegranate cultivation has increased substantially mainly because of its versatile adaptability, drought tolerance and high yield. The stage of maturity has pronounced effect on the quality of wine. Therefore, the present research work was undertaken to study the effect of stage of fruit maturity on the quality of pomegranate wine.

Material and Methods

Pomegranate fruits of Ganesh cultivar at 125, 135, 145, 155 and 165 days after flowering were obtained from the Department of Horticulture, M.P.K.V., Rahuri. All diseased and cracked fruits were sorted out and discarded and the juice was extracted by squeezing the arils gently by pressing through two layers of clean muslin cloth. A pure culture of *Saccharomyces cerevisiae* var. *ellipsoideus* (SC 3095) strain was obtained from National Chemical Laboratory, Pune. It was kept at 0° to 50°C until used for inoculation or subculturing.

The clear juice obtained at different stages of fruit maturity was adjusted to 23°Brix using sucrose separately. It was supplemented with diammonium hydrogen phosphate (0.05g/100 ml). The juice was adjusted to pH 3.0, 3.5 and 4.0 and then pasteurized at 82 to 85°C for 30 min. After cooling, the must was inoculated with a 48 hour old culture of *Saccharomyces cerevisiae* var, *ellipsoideus* (SC 3095) at 2 and 5 percent level separately. The inoculated must was incubated at 28 ± 2°C upto 15 days.

Fig. 1. Flow Chart for preparation of wine from pomegranate juice


Pomegranate fruits
Pomegranate fruits
Juice
Juice
Adjust Brix 23° and acidity 0.7%, add 0.05% DAHP, and Heated to 82 to 85°C for 30 minutes
Sugar adjusted to 23°C Brix and acidity to 0.7%, add DAHP 0.05 percent, and heated to 82 to 85°C for 30 minutes
Pasteurised juice
Pasteurised juice
Inoculated with yeast culture S. cerevisiae var. ellipsoideus(SC 3095) Incubate at 28 ± 2°C for 48 hours
Inoculum
Must fermented at 28 ± 2°C
Heated to 82 to 85°C for 30 min.
Pomegranate wine
Add 0.1 percent bentonite and centrifuge
Pasteurised must

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The fermented juice was then pasteurized at 82 to 85°C for 30 min, clarified by using 0.1% bentonite. Various steps in the preparation of pomegranate wines are outlined in Figure 1.

The pomegranate wines obtained from different treatments were analysed for chemical composition according to the standard methods of AOAC (1990). The alcohol contents in the wine was determined by the method of Natu ***et al.,*** (1986). The sensory evaluation of wines were carried out according to the method of Amerine ***et al.,*** (1980) on 20 point score card.

Results and Discussion

1) Effect of stage of fruit maturity, inoculum level and pH of the must on the alcohol content of pomegranate wine

The alcohol content in wine varied according to the different stage of maturity. The alcohol content of wine increased with increase in the pH from 3.0 to 4.0. The maximum (8.85%) alcohol content in the wine was observed from the fruit harvested 165 days after flowering and at pH 4.0, while minimum (7.00%) from the fruit harvested 125 days after flowering and at pH 3.0 (Table 1). The effect of pH of the must and inoculum level on alcohol content of wine were found to be significant while, the effect of different fruit maturity on alcohol content of wine were found non-significant. The above results are in agreement with literature reports (Joshi ***et al.,*** 1990 and Jadhav ***et al.,*** 2001).

Table 1. Effect of stage of fruit maturity, inoculum level and pH of the must on the alcohol (%, v/v) content of pomegranate wine

Treatment	Stage of fruit maturity (days after flowering) C1	C2	C3	C4	C5	Mean
A1B1	7.00	7.08	7.14	7.21	7.25	7.13
A1B2	7.22	7.40	7.46	7.54	7.65	7.45
A2B1	7.42	7.50	7.62	7.78	8.00	7.66
A2B2	8.10	8.20	8.28	8.34	8.50	8.28
A3B1	8.00	8.14	8.23	8.30	8.40	8.21
A3B2	8.18	8.30	8.60	8.68	8.85	8.52
Mean	7.65	7.77	7.88	7.97	8.10	7.87

Factor/Interaction	S.E. ±	C.D. at 5%
A	0.160	0.452
B	0.130	0.369
C	0.206	N.S.
A × B	0.226	N.S.
A × C	0.357	N.S.
B × C	0.292	N.S.
A × B × C	0.506	N.S.

A1 = pH 3.0
A2 = pH 3.5
A3 = pH 4.0
B1 = 2 percent inoculum level
B2 = 5 percent inoculum level
C1 = Fruits harvested after 125 days of flowering
C2 = Fruits harvested after 135 days of flowering
C3 = Fruits harvested after 145 days of flowering
C4 = Fruits harvested after 155 days of flowering
C5 = Fruits harvested after 165 days of flowering

2) Effect of stage of fruit maturity, inoculum level and pH of the must on the overall acceptability of pomegranate wine

It was observed that the overall acceptability of wine varied according to the fruit maturity. The score of overall acceptability of wine increased with increase in the pH upto 3.5 and thereafter, it decreased. The wines prepared under the conditions of fruit harvested 165 days after flowering, at pH 3.5 with 5 percent inoculum scored maximum (16.99) for overall acceptability, while minimum (14.53) from the fruit harvested 125 days after flowering, at pH 4.0 with 2 percent inoculum (Table 2). The results obtained are comparable with reports in literature (Mir ***et al.,*** 1988, Kotecha ***et al.,*** 1994 and Krishnaveni ***et al.,*** 2000).

Table 2. Effect of stage of fruit maturity, inoculum level and pH of the must on the overall acceptability of pomegranate wine (Score out of 20)

Treatment	Stage of fruit maturity (days after flowering) C1	C2	C3	C4	C5	Mean
A1B1	15.64	15.73	15.80	15.89	16.02	15.76
A1B2	15.57	15.89	15.97	16.11	16.22	15.95
A2B1	15.67	15.77	15.87	15.95	16.17	15.88
A2B2	16.51	16.62	16.73	16.82	16.99	16.73
A3B1	14.53	14.66	14.80	15.07	15.27	14.86
A3B2	14.76	15.15	15.20	15.23	15.35	15.13
Mean	15.44	15.63	15.72	15.84	16.00	15.71

Factor/Interaction	S.E. ±	C.D. at 5%
A	0.010	0.029
B	0.042	0.123
C	0.013	0.037
A × B	0.014	0.041
A × C	0.023	0.065
B × C	0.018	0.053
A × B × C	0.032	0.092

A1 = pH 3.0
A2 = pH 3.5
A3 = pH 4.0
B1 = 2 percent inoculum level
B2 = 5 percent inoculum level
C1 = Fruits harvested after 125 days of flowering
C2 = Fruits harvested after 135 days of flowering
C3 = Fruits harvested after 145 days of flowering
C4 = Fruits harvested after 155 days of flowering
C5 = Fruits harvested after 165 days of flowering

Thus, the results obtained in the present investigation indicate that the fruits harvested 165 days after flowering, pH 3.5 and 5 percent inoculum are the optimum conditions for the preparation of good quality pomegranate wine.

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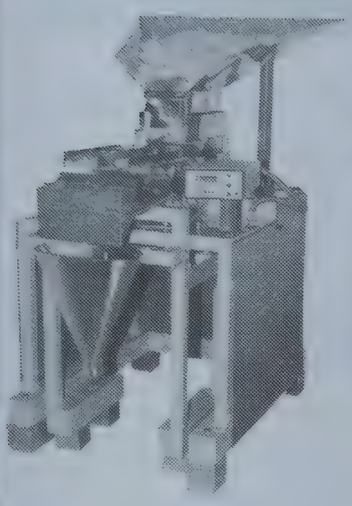

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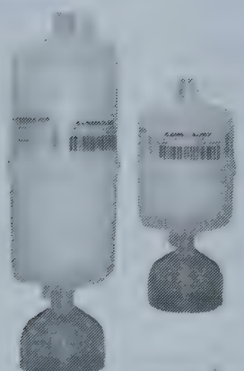

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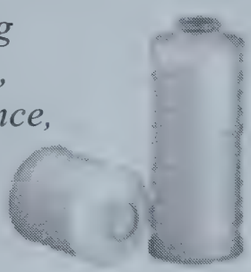

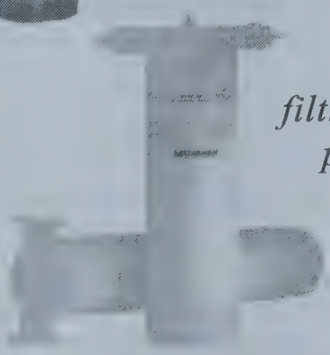

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COMPANY NEWS

FONTERRA CO-OPERATIVE/BRITANNIA INDUSTRIES LTD.

Biscuits and Bakery products major, Britannia Industries Ltd., has signed a joint venture deal with Fonterra Co-operative Group Ltd., New Zealand's biggest company and one of the leading cooperative groups in the world. Fonterra will invest Rs. 110.4 crores in this joint venture for picking up a 49 per cent stake in the new company.

The new venture will operate Britannia's existing dairy business, which includes marketing and distribution of milk and milk products. Sources said that in the long-run, the joint venture is expected to set up a milk processing plant. Milk based products will be manufactured in this unit, packed and distributed through the existing retail chain of Britannia.

Once the joint venture gets operational, the New Zealand partner will bring several new products from its basket to India. The JV will source dairy products from the Baramati based Dynamix Dairy Industries with which Britannia has a processing and packaging agreement.

Britannia Industries has also acquired a 49 per cent stake in Snacko Bisc, along with the trademark Nutrine for only bakery products and several other trademarks, copyrights and designs.

Britannia had diversified into dairy products in 1997 and is present in the cheese, dairy whitener, butter, ghee, liquid milk and flavoured milk segments under the Britannia Milkman brand name. The acquisition of snacks Bisc follows its recently acquired 49 percent stake in the Bangalore - based Kwality Biscuits for Rs. 30 crores.

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DABON INTERNATIONAL

Dabon International, a 50:50 joint venture between Dabur India and the $4 billion French dairy major Bongrain International, has withdrawn bottled flavoured milk and srikhand from the market.

The company has also shelved its plans to introduce non-cheese based products. Apart from cheese, Dabon will soon launch milk jam (bread spread) targeted mainly at children. It also intends to launch desserts such as puddings, which a Bongrain group company makes in France, and is test marketing it in India. Dabon has no plan's to launch milk in liquid form such as Amul, Nestle and Britannia.

The company, which markets its products under the Le Bon brand name, now plans to concentrate on a variety of cheese. The company has already brought many international flavours of cheese into the country. Flavours include black pepper, herbs, garlic and curry capsicum. Some of these products were imported from Australia. Now they are produced at the company's unit in Noida. The flavoured milk was being imported from Bongrain's factory based in the Tianjin province of China. The government had objected to the company importing and selling Le Bon flavoured milk from China and test marketing it in the domestic market as it resulted in domestic trading which is not permitted. However, it gave Dabon permission to test market the product, and sell cheese after the company informed that it has set up a manufacturing unit in the country and the milk was only being test-marketed.

DE KUYPER

The Indian Liqueur market will witness the entry of the world's largest liqueurs manufacturer De Kuyper of Holland, through an exclusive tie-up with Delhi based Mohan Brother (P) Ltd.

The $425 million Dutch company will introduce in India cocktail liqueurs such as Creme de Bananes, Creme de Cassis and Creme de Menthe Green apart from Curacao Blue and Triple Sec. Subsequently, it will introduce other products such as Peach Schnapps and pre-mixed drinks Pina Colada and Strawberry Margherita.

De Kuyper is looking at a 30-35 per cent share of the 5,000 cases (of nine litres each) per annum in the Indian cocktail liqueur market within the first year of its launch. The Indian market is small but is growing at the rate of 25-30 per cent. Worldwide, De Kuyper sells more than 4.3 million cases annually.

GUJARAT CO-OPERATIVE MILK MARKETING FEDERATION (GCMMF)

Gujarat Co-operative Milk Marketing Federation has launched "Masti Kadhi" available at Rs. 5 for a 500ml pouch. The product has already proved to be a hit in Anand, where it was initially launched. Made from whey, Kadhi is a high nutrition food and a mass consumption product.

Manufactured at Vidya Dairy, Anand, 'Masti Kadhi' consists of whey, chana dal powder, a mix of spices and a dash of ghee. The result is a thick soup that is traditionally eaten in conjunction with rice or khichdi, but can also be consumed as a starter.

"Masti Kadhi" is a brand extension of

"Masti Dahi" and at present its shelf life is only four days. Soon the packaging technology will be improved and "Masti Kadhi's" shelf life will be increased to three months.

AMUL

Gouda Alpine cheese, a product from the Sikkim Dairy Board, will now be marketed entirely by Amul. Gouda Alpine cheese project was a joint initiative of the Government of Sikkim and Government of Switzerland.

Gouda Alpine cheese is a semi hard variety of cheese which is available in limited quantity in the metros. Till now, it was manufactured and marketed by the Sikkim Dairy Board. Amul however plans to roll out Gouda cheese nationally.

Gouda cheese is still not a hot favourite among Indians. One has to build a taste for it. Amul feels that by launching it nationally, the product will gain acceptance at least among the upper echelons of society. Also, it will give Amul the early mover advantage in the niche category.

Amul has three varieties of cheese under its umbrella: cheddar, mozzarella and emmental. The cheese market is estimated at 6000 tonnes annually and Amul says it has 65 per cent share of the market.

VASISTHA VENTURES

Vasistha Ventures from Mauritius will acquire 37 percent stake in Mount Everest Mineral Water, the company which manufactures and markets "Himalayan" brand mineral water.

The Himalayan brand, which bottles natural spring water, mostly caters to institutional buyers like airlines, hotels and restaurants. Its competitors include 'Catch' of the DS Group and 'Perrier' of Nestle. Unlike Kinley, Bisleri, Aquafina, which are treated and then bottled, Himalayan bottles natural mineral water.

CADBURY SCHWEPPES

The UK-based Cadbury Schweppes is likely to re-enter into the Indian beverages market through the launching of its iced tea brand "Snapple" assisted by Tata Tea. Snapple also has a presence in the ready to drink market, besides the fruit drinks and juices sector.

Cadbury Schweppes had launched soft drinks in India in 1995. But Cadbury Schweppes Beverages India, the wholly owned subsidiary of the UK firm, became aggressive in the Indian soft drinks market only in 1997. However, in 1999, Coca-Cola took over Cadbury Schweppes's soft drinks business, including brands like Crush, Canada Dry and Schweppes, in 155 countries. As a result, Cadbury Schweppes Beverages India became a part of Coca-Cola India.

Snapple is one of the biggest customers for US-based Tata Tea Inc's instant tea. Based in Florida, Tata Tea Inc is a wholly owned subsidiary of Tata Tea Ltd. and packages and markets instant tea in the US.

According to the Tata Tea website, Snapple was first launched in the US using Tata Tea's instant tea powder.

Fast moving consumer goods industry analysts say iced tea is a fast emerging segment in the impulse purchase category.

HINDUSTAN LEVER LTD.

Hindustan Lever Ltd.,(HLL) the Rs. 11,000 crore fast moving consumer goods major is now set to enter the ready-to-eat food category. The company will launch chapatis under the brand name "Annapurna" and will be sold through the Modern Bread outlets.

HLL has also launched the Annapurna salt with a new technique which encapsulates iodine in a way that it remains protected. The technique, according to the company, is the first of its kind in the world.

To gain strategic advantage for its vanaspati brand 'Dalda Activ' launched recently, the company is targeting sweet shops which consume a sizeable chunk of the vanaspati, and is educating them about positive health benfits.

DHAMPUR INVERTOS LTD.

After sugar, Dhampur Invertos Ltd. has now launched branded jaggery in the market under the brand name 'Gold N Brown'. The company claims that the product is made of natural ingredients and is free of artificial colours and flavour. The company also says that the product is untouched by hands while processing it, in addition to being shrink-wrapped to retain its natural aroma, taste and flavour.

The product has been launched in two pack sizes of 250 gm and 1 kg priced at Rs. 12 and Rs. 29 respectively.

UNITED BREWERIES

United Breweries (UB) chairman Vijay Mallya had recently announced that he was searching for a strategic partner to bring international brands to India and help UB to market its Kingfisher brand abroad. This announcement has made four of the world's top beer makers vie for a stake in United Breweries, which would give them a large share in the potentially huge market.

Sources close to the deal said Belgium's Interbrew, Dutch Heineken, South African Breweries and Denmark's Carlsberg were in talks to buy the 26 per cent India's top brewer wanted to sell.

A team from Interbrew, led by senior mergers & acquisition official Hans Erik Rhodius, was in Bangalore, United Breweries' headquarters, for preliminary talks. Interbrew plans to bid in conjuction with an Indian partner based overseas, the sources said.

SOUTH AFRICAN BREWERIES

South African Breweries (SAB), a subsidiary of the $4.1 billion South African Breweries Plc, picked up 53 per cent controlling interest in the Rajasthan-based Rochees Breweries for around Rs. 9.7 crore.

Rochees has an annual capacity of 1,10,000 hectolitres, or around 1.5 million cases, thereby taking SAB's total capacity in India to 6 million cases.

Rajasthan is the fifth largest beer consuming state in India, and growing at around 8-10 per cent annually.

SAB began its India operations with the acquisition of Narang Breweries in Uttar Pradesh, last year, it also acquired the Bangalore-based Mysore Breweries, which owned the Knock Out brand of beer.

Subsequently, it also acquired Mysore Breweries subsidiary Pals Distillers in Aurangabad at a total cost of Rs. 108 crore. SAB has plans to invest $100 million by 2006 to increase its capacity in India. SAB is one of the companies in the running for a 26 percent stake in Vijay Mallya's UB group's brewery business.

SHAW WALLACE & CO. LTD.

After launching Kohinoor beer in the US, Shaw Wallace the first Indian company to get the approval of its products by USFDA is all set to launch its liquor brands in the US. The brands which have received the approval are Director's Special, Director's Special Black, Antiquity and India's Pride rum. The demand for ethnic beer is very strong in the US. Kohinoor is doing extremely well.

Shaw Wallace is also in the process of exporting Haywards strong beer to Japan.

Shaw Wallace will exit from its joint venture with Ushers of Trowbridge which had the mandate to sell Lal Toofan in the UK and US.

Shaw Wallace recently announced a global tie up with London based Kyndal Group which is one of the world's largest producers of scotch whiskey. Kyndal has an impressive portfolio, including Whyte and Mackay, Dalmore and Single Malt, Vladivar, Vodka, Veba ready-to-drink mix and Glavya Mixers.

While Kyndal will be using Shaw Wallace's distribution network in India to sell its products, the latter in turn is expected to be benefited by Kyndal's worldwide distribution network, for exporting its products which includes its flagship brands Antiquity Rare Premium Whisky, Royal Challenge Whisky and Directors' Special.

Shaw Wallace is planning to bottle Whyte and Mackay in India by importing the bulk concentrate. It plans to sell 6,000

to 7,000 cases in the currently one lakh case, Indian scotch market. The brand, if imported in bottles, would be priced around Rs. 1200.

The company's existing breweries have a capacity to produce 23.3m cases annually. The six greenfield projects will add another 4.8m cases a year. The breweries acquired by the company would produce another three million cases. An additional seven million will be acquired through strategic tie ups with breweries in various states. The total brewing capacity of Shaw Wallace in the year '02 is projected to exceed 38m.

The new breweries are being setup in Kerala, Karnataka, Goa, J&K and Rajasthan. The new breweries, all greenfield projects, would cost the company another Rs. 200 crore.

COCA-COLA INDIA

Coca-Cola India, the carbonated soft drinks major, launched its first ever powdered soft drink concentrate 'Sunfill". Sunfill is available in orange flavour and comes in two sizes, a 25-gram sachet (Rs.2) and a 200-gram pillow pouch (Rs.15). The product is essentially targeted at the southern and western markets of the country. Initially, the product will be available in orange flavour and few more regional flavours including mango, elaichi will be added later.

Sunfill is manufactured by a contract manufacturer in Bhopal. The company has invested close to $1m for a capacity of 8m cases and plans to increase the capacity.

In the aerated drinks segments the company is planning to launch "Portello", a black currant flavoured drink and at the same time relaunch "Rimzim", the popular masala soda brand. Portello which will be made available in returnable glass bottles, will bear a price tag of Rs. 10 per 300 ml bottle. Rimzim will be available in 250ml bottles and will be priced Rs.7 per bottle.

Coca-Cola has also reported a tremendous growth in its bottled water business during the past one year. Kinley is bottled in 14 plants across the country. Eleven more plants will be added soon, giving an indication of the company's focus on the new business. A substantial portion of their water sales is now coming from large size (25 litre) packs.

Coca-Cola India is also expanding its portfolio of non-alcoholic beverages by entering the tea and coffee business.

ODWALLA/COCA COLA

Coca-Cola, the world's top soft drinks company, has agreed to buy Odwalla for $181m in a move that will strengthen its position in the juice business.

Odwalla, whose products include fresh fruit and vegetable juices, dairy-free shakes and spring water, will become a separate business unit of the Minute Maid Co., Coca-Cola's juice division.

The acquisition of Odwalla adds to a string of recent deals put together by Coca-Cola. In the past year, the soft drink giant has acquired Planet Java, a maker of coffee drinks and Mad River Traders, which distributes New Age teas, juices, lemonades and sodas.

SPICES INFOTECH PVT. LTD.

The Kochi-based Spices Infotech Pvt. Ltd. has launched a vertical portal to provide online information and trading service for the spice industry.

The portal www.spizes.com would provide information on a wide variety of subjects such as crop reports, market trends, statistics, machinery, process, technology etc. This is the first and the only internet portal exclusively for the spice industry.

The company has tied up with various spice associations to provide the latest updates on every aspect of the industry. The portal would also offer online trading and auction opportunities, third party quality testing and logistics services. It has also made arrangements for worldwide door to door delivery of samples and consignments through reliable carriers.

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WALTER HEINDL/MB INTERNATIONAL

Walter Heindl, a $15-million Austrian chocolate manufacturer, is planning to launch a wide range of chocolates in India. For this purpose Walter Heindl has entered into a strategic alliance with MB International Ltd., which will be the distributor for their products sold in India. Initially 14 different varieties of chocolates will be launched in India, out of which seven will be liqueur based and rest non-liqueur based. In fact, for the Indian market they would be changing the blend as European chocolates are little bitter in taste and add more sweetness and richness to the chocolates accordingly.

NESTLE / SMITHKLINE / NABARD

Dairy farmers in Punjab and Haryana will not have to worry about the sale of milk. Nestle India and Smithkline Beecham, in partnership with Nabard, will tie up with the dairy farmers for purchase of milk and extend them marketing support. By the end of the year, around 700 farmers in both States are likely to benefit. Under the agreement, the farmers identified by these companies will get loan to buy milch cattle and required infrastructure from banks. The banks, in turn, will be re-financed by Nabard. Nestle and SmithKline will purchase milk from these farmers regularly. The companies will advise the farmers on good quality cattle, provide animal feed at concessional rates and free veterinary services. The Rate of milk will be decided by the companies in accordance with the price in the market.

PRAVIN MASALEWALE

Pune based Pravin Masalewale have launched their products in new packaging, under three different brands, namely Ambari, Ambari Suhana and Sarvam.

Ambari is the flagship brand of the company and will have a range of spices and masalas like Kanda Lasun Masala, Chilli, Turmeric, Coriander, Goda Masala and Garam Masalas.

The Ambari Suhana brand will have spices for special preparations like Biryani Sambhar and Pav Bhaji Masala.

Sarvam will be an entry level product range for packaged spices and the product range under this brand will be Agmark certified Chilli, Turmeric, Coriander and Garam Masala.

The newly branded and packaged products will be launched throughout Maharashtra in the first phase and also in markets in the adjoining States.

Pravin Masalewale presently produces 625 MT of various spices and is adding capacities to manufacture up to 1500 MT per month of spices in the coming months.

NESTLE INDIA

Nestle India is gearing up to launch a whole range of biscuits and cookies in the market within this financial year. The company is looking at the possibility of launching the new products under the "Milkmaid" brand name, which is also the popular brand for the company's condensed milk.

Chairman and managing director Carlo M Donati said the biscuit manufacturing unit is being restructured and the company will be revived shortly. On Milkmaid being the mother brand for biscuits, Donati said he would not be able to say at this point in time. The biscuit manufacturing business – the erstwhile Excelsia Foods Ltd. – was acquired from Dabur India Ltd. more than a year ago.

NORTH EASTERN REGIONAL AGRICULTURAL MARKETING CORPORATION LIMITED

North Eastern Regional Agricultural Marketing Corporation Limited (NERAMAC), set up by North Eastern Council, (NEC) during 1982 was referred to BIFR (Board for Industrial and Financial Reconstruction) during 1996 and a revival package was drawn effective from April 1999 to augment production and facilitate marketing of agri-horticultural commodities and processed products of North Eastern Region. During the review meeting held by BIFR, NERAMAC was discharged from the purview of SICA (Sick Industries Companies Act) considering the Company's performance for last two years and that its net worth has now become positive.

NERAMAC during the fiscal year 2000-2001 has ended with an all time high turn over of Rs. 27.70 crores an increase of around 400 percent than that of 1999-2000. The percentage loss has also been reduced to the extent of approx. 57 percent during this fiscal year as compared to the previous year.

During 2000-2001 besides its regular activities of running cashew processing plant and the pineapple juice concentration plant at Tripura, the Corporation has also taken up marketing of different agro-horticultural items on a wider scale. Notable among these are Ginger from Assam, Meghalaya, Manipur and Tripura, Bird's Eye chillies from Mizoram, Malze from Assam, Black pepper from Meghalaya and Tripura, Cashew nut from Tripura, Supari from Assam and Phool jharu/broom from Assam & Meghalaya. NERAMAC has also started supporting farmers by organising supply of Agro-horticultural inputs like fertilizers, seeds etc. It has increased supply of fertilizers in Tripura & Manipur many fold this year and supplied Seed potato in the states of Mizoram, Tripura and also animal feed ingredients and sugar.

In order to support the existing small-scale food processing units of the North Eastern Region, the Company during this financial year has also procured and supplied packaging materials to fruit processing units. NERAMAC has also exported true potato seeds to Korean Rural Restoration Society, South Korea valued at 4,500 US$. Earlier also NERAMAC has exported True potato seeds to Bangladesh, Indonesia & Nepal.

To help the pineapple growers of the region, NERAMAC has signed a tripartite agreement to supply fresh pineapple through Bangladesh to other parts of the country during this pineapple season. The company has also initiated dialogue with food giants like Dabur, Hindustan Lever etc. to supply processed products of the region to them in bulk packing. The Company has decided to take up pack houses, warehouses and cold storages for all the states of the north eastern region and set up processing plants under joint venture with private sector in the region.

VADILAL

Ice-cream manufacturer Vadilal has launched a range of frozen vegetables and foods in the domestic market, including ready-to-cook *parathas* and *samosas* and heat-and-eat curries. The company, which is already successfully exporting these products in the overseas market under the name Quick Treat, has now decided to introduce the brand in the domestic market. "In the microwave era, there is a good market for frozen foods in the urban areas, especially metros," General Manager (food processing). Mr. Maulin Surati, said. "The brand is well-accepted in USA, UK, Canada, New Zealand and West Asia. So we are confident of succeeding on the domestic front as well." To begin with, the company has already launched its frozen foods and vegetables in Ahmedabad through 10 exclusive outlets.

BEL

Bel a Franch company having 400 cheese brands has already made inroads in the Indian Market with its "Laughing Cow" brand cheese. It plans to set up a 100 percent subsidiary in India and to use the country as a manufacturing hub for pure vegetarian cheese which will also cater to other asian countries. It plans to have tie-up with contact manufacturers providing technical know-how.

Bel with have to compete with heavy duty brands like Amul and Britannia.

The cheese market is estimated at 6,500 tonnes. While cheese tins account for 50 per cent of the market, cubes and slices account for 25 per cent and 15 percent respectively. Cheese spreads account for the rest.

INDIAN NEWS & NOTES

ANTI-DUMPING MEASURES TO PROTECT POULTRY SECTOR

After quantitative restrictions were removed, import of poultry products of unknown brands were cleared by customs without checking them for health, hygiene and PFA labelling standards. Poultry products like chicken salami, chicken hot-dogs, chicken luncheon meat, chicken cocktail sauges imported from Denmark, duck liver paste, goose liver paste imported from Germany; chicken hot-dogs imported from London; chicken ham rolls, chicken salami and chicken franks imported from France and chicken bologna imported from the US land in the Indian market without any sample testings, health checks and the other requirements for PFA labelling. These products can bring in a lot of diseases that are not present in the country.

Developed countries are exporting poultry products to India at a very low price making it necessary to put in place proper mechanisms to control dumping. Recently, a consignment of turkey and chicken meat reached Delhi and according to the bill of entry, they were exported at 0.70 cents per Kg. whereas the rate of turkey meat in France is $10-11 per kg. This huge difference in the local and the exported price does not match with any subsidies and refunds. May be this is under-invoicing or some other technique to dump the products in India.

The European Commission is also one of the largest exporters of agricultural products because it provides significant export subsides to exporters. These heavily subsidised exports depress the market prices, damage domestic agriculture and displace exporters from their traditional export markets.

In order to protect India from becoming a dumping ground for poultry products, the government should impose barriers like higher tariffs, sanitary and phyto sanitary measures, traceability rules and put in place domestic standards for health and hygiene.

WHITE SPOT VIRUS TAKES ITS TOLL ON SHRIMP FARMING

Shrimp farming, often considered as the sunrise industry of the 1980s, is close to extinction due to a number of factors including the outbreak of the dreaded White Spot Virus (WSV) disease.

The shrimp cultivation is largely in the small-scale sector. It is estimated that over 85 percent of the shrimp farmers have less than two ha of water area under cultivation. Reduced stock densities arising out of the outbreak of WSV has also discouraged large scale operators from entering this field.

Shrimps affected by the virus have a calcium deposit in the inside walls of the carapace (the hard upper shell of crustaceans and such animals). The affected shrimps stop feeding and die within a period of three to ten days. Crop loss is estimated as high as 60 to 100 percent.

The Central Institute of Brackish water Aquaculture (CIBA) spearheads the research and development in brackishwater aquaculture.

CIBA was established in 1985 by reorganising the existing fisheries research institutes of the Indian Council of Agricultural Research (ICAR) to develop new technologies to promote sustainable aquaculture. CIBA focusses on production of genetically-improved quality shrimps, crabs and fish seeds and developing ecofriendly feed and diagnostic techniques and control measures for diseases in shrimps and fishes. CIBA has developed a simple and easy to use diagnostic kit that uses polymerase chain reaction (PCR-A polymerase is a naturally occuring enzyme, a biological macro molecule that catalyzes the formation and repair of DNA and RNA).

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KARNATAKA PLANS FRUIT, VEGETABLE EPZ

The Karnataka State Agriculture Produce Processing and Export Corporation plans to set up export-processing zones in Kolar, Chitradurga and Bijapur for various horticulture produce at a cost of Rs 20 crore. Besides providing the much needed support in terms of post-harvest facilities, this move would also help in promoting exports of horticulture crops.

These zones will ensure that the fruits and vegetables are cleaned, graded and packed. The zones would also have pre-cooling and cold-store facilities.

The zones will process and export pomegranates, mangoes, grapes, acid lime and Bangalore rose onion (used mostly for pickling purposes). The corporation is the canalising agency for exports of Bangalore rose onion. The state produces close to 70,000 tonnes of Bangalore rose onion. Around 38,000 tonnes were exported last year and this generated foreign exchange to the tune of Rs 50 crore.

Karnataka is the second biggest producer of acid lime, grapes and pomegranate and the fourth biggest producer of mangoes. Bihar, Uttar Pradesh and Andhra Pradesh are the other major mango-cultivating states.

TARIFFS ON LIQUOR IMPORTS: EC MAY TAKE INDIA TO WTO

The European Commission (EC) may take India to the Wrold Trade Organisation (WTO) if its demands regarding tariffs on imported liquor are not met in the next budget.

Though the government had removed quantitative restrictions on liquor imports with effect from April, 2001, the high duties have seen a drop in liquor imports as well as a fall in government revenue since then. Industry estimates suggest that the import of liquor has gone down by 60-70 percent since April 1 and customs revenue has fallen by almost 20 percent.

The Scotch Whiskey Association now wants a 24 percent duty as import duty. The EC had earlier written to the Indian Government alleging five breaches of its commitment to the WTO on the issue.

FRENCH WINE MAKERS SCOUT FOR ALLIES IN INDIA

Sixteen major French wine makers, are on the look out for distributors or joint venture partners in India.

India is an attractive market, but the high tariff rates, which increase the price of wines, is a major roadblock. But most participants who took part in an exhibition held recently are excited about the fact that the market has finally been opened up. They all expect that the tariff rate will come down eventually. The Indian wine market is currently Rs 50 crore.

For example Compagnie Francaise des Grands Vins (CFGV), a leader in French sparkling wines, exports 70m bottles and earn $70m a year. The average price is $1 per bottle. But when it reaches the Indian market the market price will be five or six times higher, thanks to tariffs. This is because the wine importer has to pay 100 percent basic customs duty, a countervailing duty of 150 percent, and special additional duty of 4 percent and the special fee of Rs 100 per bottle levied by Maharashtra state.

FOREIGN LIQUOR FIRMS ARE HEADING INDIA'S WAY

The prohibitive duty structure and the post-September 11 uncertainty has not deterred foreign liquor companies from foraying into the Indian market. Consider the case of Smart Drinks, the manufacturer of the Energy Drinks range from Austria. The company is coming out with a new beer brand christened 'Red Ganesh'.

Smart Drinks, if it enters Indian market, will have company from Ornajboom from Holland, the Mexican beer Corona and Heineken from Holland.

Jorge Fontaine of Vina El Principal, a company that produces premium wines in Chile, wants to enter the Indian market. Mr Fontaine sells his product for $18 in Europe. In India, he hopes to sell it for $40. It is very difficult to sell wine because of the high duty structure, but India is a big market.

RECYCLING OF SPIRITS AND BEER BOTTLES

A starting revelation has been brought to light by a recent study that 83 percent of beer bottles and 35 percent of liquor bottles are reused.

Recycled bottles are supplied to the breweries in a sack. A very general cleaning procedure is adopted at the dealer level while cleaning and washing of the bottles are done by the units. While the smaller units do the washing manually, bigger ones use automatic machines.

Recycled bottles are washed using chemicals like caustic soda and sodium phosphate, etc. If the quantity of these chemicals is too high, it results in stains on the bottles and the narrow necks of these bottles hinder proper cleaning.

Also, the bottle has to be round if it has to be cleaned and reused because machine washing, irrespective of quality, cannot reach the corners of a non-round bottle. Therefore, unlike beer bottles which are round, whiskey and other liquor bottles are not round and should not be reused.

Reusable bottles are designed differently than non-reusable bottles. They are thicker, heavier and designed to ensure that they withstand several rounds before being discarded.

Recycling not only saves the manufacturers the 16 percent excise duty they have to pay on new bottles, it also cuts costs as the recycled bottles are cheaper than new ones.

BISCUIT INDUSTRY GROWTH DECLINES

The biscuit manufacturing industry is a low margin industry. The industry has already faced ten percent decline in growth in 2000-01 and is facing a similar situation in 2001-02. This is mainly due to the impact of Central Value added Tax (CENVAT) and hike in excise duty to 16 percent.

The Federation of Biscuit Manufacturers of India (FBMI) has asked the Centre to exempt biscuits from Central Value Added Tax (CENVAT) and excise duty and bring down the sales tax on the product to four percent to give a boost to the industry.

Biscuit production during 2000-01 stood at 45,00,00 tonne FBMI president Nikhil Sen said while excise duty on food products like juices, jams, jellies, wafers and sauces were reduced to zero per cent in the 2001-02 Budget, the duty on biscuits was raised to 16 per cent from eight per cent. If the excise duty is abolished, the industry is confident of increasing demand by 20 per cent via a drop in consumer prices.

CUT IN IMPORT DUTIES ON LIQUOR

The revenue department and the food-processing ministry are pushing strongly for duty rationalisation on liquor, beers and wines.

The food processing ministry has mooted a separate alcoholic beverages policy to widen the domestic market and explore exports for Indian wines and beers.

Rationalisation of levies on alcoholic beverages is necessary since excise policies, duties licensing systems etc are in the domain of state governments and vary widely from state to state.

There is also the legal issue of whether excise (state or central) can be imposed on imports, as excise is a levy on manufacture goods.

The food processing ministry has mooted the idea of constituting two working groups. One would be entrusted with the task of arriving at the correct level of countervailing duty, which would be conducive to imports without affecting domestic interests.

The ministry of Food Processing seems to be pushing for a higher rate of CVD for liquor and lower on alcoholic beverages, including imported beer and wine.

The food processing ministry had suggested four rates for liquor, with a 9-litre case of cheap imported liquor being charged to CVD at 200 percent, while the premium varieties were to be charged CVD at 75 percent. In case of wine, it had suggested that CVD be pegged at 50-70 percent of the minimum retail price (MRP). On beer, the product should be subject to levies over and above the custom duty to offset the excise burden on domestic manufacture.

The existing structure treats all imported liquor alike. The food processing ministry has its own plans for increasing consumption of alcoholic beverages by having a differential rate of duty for beer and wines and hard alcohol.

The other working group would be entrusted with the task of evolving a comprehensive alcoholic beverages policy. It would study the excise polices, duties/levy structure prevalent in various states – the rates vary widely – consider social, legal, revenue and economic aspects, and work out a policy guideline after studying the systems in vogue in other countries.

This committee would also look at evolving an alcoholic beverages policy which would provide a level playing field for the domestic producers, examine the import of bulk concentrate and export obligations, review the government policy on promotion of wine and beer, including standardisation of labelling requirements and defining the alcoholic content in beer.

BEVERAGE TAG FOR BEER

The state governments have been treating beer as an alcoholic product and levying taxes accordingly. The All India Brewers' Association, has asked the Union government to delink beer from IMFL for the purpose of framing policy. The association has submitted a draft for beer policy to the government suggesting changes in its beer policy.

The government of Uttar Pradesh has delinked beer from IMFL and issued a separate class of wholesale and retail licenses for the sale of beer, as a result, the sale of beer has gone up by 50 percent over the previous year.

The industry points out that most advanced countries treat beer, which has a low alcoholic content ranging from 4.5 to 8 percent, as a beverage that can be sold in any retail outlet without any special license. For example, in Singapore, a can of beer can be bought from a gas station, while waiting for gas refilling.

FORTIFICATION OF MORE FOOD ITEMS

Government of India is exploring various avenues for tackling mass nutritional problem due to deficiences in Vitamin A, iron and iodine

After iodised salt, research institutes are now working on double fortification of salt with iodine and iron, even as the Government explores avenues to fortify food items such as sugar, atta and edible oil.

Research on the double fortification of salt is being done by the Hyderabad-based National Institute of Nutrition (NIN), under the aegis of the Indian Council of Medical Research (ICMR).

The Mysore-based Central Food Technological Research Institute (CFTRI) is conducting a research study on fortification of edible oils with vitamin A, while pilot studies are being conducted by the Pune-based Vasandada Sugar Institute for the fortification of sugar, also with vitamin A.

RESTRICTION ON FOOD PRODUCTS' IMPORTS

Food Products with less than 60 percent of their original shelf life have been barred from imports in India. The import of food products, which are governed by prevention of Food Adulteration Act have been subject to the condition in a notification issued by the Directorate General of Foreign Trade. The shelf life of the product would be concluded on the basis of the declaration given on the label of the product about its date of manufacture and due date of expiry. The importers of food products have been asked to comply with the provision so as to facilitate the regulators at the ports of entry to clear their products without any difficulty.

MODEL SUPPLY-CHAIN FOR FOOD PROCESSING FORMULATED

The National Task Force on Food Processing (NTFFP) has laid out a supply chain management structure. An estimated 40 percent of fruits and vegetables get wasted due to their perishable nature in the absence of adequate storage and cold-chain facilities. The model supply-chain parameter involves 'HLC or Handle with Love and Care' techniques involving simple measures like pre-sorting at the farm level. This model can be adopted for different fruits and vegetables from different agro-climatic regions. The model supply-chain management structure would be conveyed to farmers and cooperatives through extension services of the state Government. This would cut the loss through wastage by less than 20 percent, besides reducing the intermediaries between the farmer and consumer. This eventually would improve quality as well as reduce prices at the consumer's end.

MADHYA PRADESH MILK OUTPUT GOES UP

The milk production in Madhya Pradesh has shown a significant increase from 2,11,777 kg per day in April 2000 to 3,29,265 kg per day in March this year. Stating this, an official release said that the regional Dugdha Sanghas and the village-level 4,000 cooperatives that function under the apex Dugdha Mahasangh were responsible for production and procurement of milk in the state. Madhya Pradesh stands third in milk production after Uttar Pradesh and Punjab contributing eight percent of the country's total milk production. The State Government has given top priority to the dairy sector keeping in view the immense employment potential and favorable circumstances for dairy business.

FOOD IRRADIATION UNITS

The country's first seafood irradiation centre will be either Bhubaneshwar in Orissa or Visakhapatnam in Andhra Pradesh.

According to the Marine Products Export Development Authority (MPEDA) the facility is expected to process approximately to Rs 400 crore of seafood exports every year.

The proposed irradiation plant will have a capacity to process around 10,000 tonnes annually which will result in irradiation of two tonnes of seafood per hour.

The Bhabha Atomic Research Centre (BARC), which is to execute the project has received two other mandates from the private sector to set up such centres, one at Vasai near Mumbai for spices and another at Kundli in Haryana for potatoes, garlic, basmati rice etc.

The Vasai project is expected to have an irradiation capacity of two tonnes per hour while the Kundli project will have a capacity of 25 tonnes per hours.

Irradiation process is fully in tune with the WTO norms on food trade.

Food irradiation process is mainly used to extend the shelf life of cereals, pulses, tropical fruits, vegetables, seafood, meat and poultry, which reduces the post-harvest losses of these products considerably.

FRENCH TEAM ON FOOD PROCESSING COMING TO HIMACHAL PRADESH

France will soon send a team of experts to Himachal Pradesh to explore the feasibility of setting up food processing units in the State.

The team to be headed by the French Ambassador to India, Mr Bernard de Montferrand, would visit the State soon to explore the feasibility of setting up food processing units and discuss modalities in this regard.

Mr Dhumal, chief minister of Himachal Pradesh who met the French Agriculture Minister also requested him to look into the State's proposal for setting up an agrotech complex.

FOOD TESTING LABORATORY IN PUNE

A world-class food testing laboratory is planned under the Small and Medium-scale Enterprise (SME) Cluster Development Programme at Pune.

The central ministry of food processing has sanctioned Rs. 80 lakh for the project.

The food processing cluster in Pune, a major quality upgradation programme for certification of international "Hazard analysis and critical control point" (HACCP) was launched 2 years ago which will lead to 10 certifications by March 2002 from the existing one.

GLOBAL PRICES OF INDIAN SHRIMPS ON THE RISE

Prices of Indian shrimps in the international market have recovered some of its recent losses in the last few days. The prices have moved up to $11 per a count of 16 to 20 black tiger shrimps in the last 10 days or so from a level of $9.5 till the middle of November.

The prices were ruling very healthy at $17 at the beginning of this year. However, excess supply over demand, increased competition from countries like Indonesia and Vietnam, and the slowdown in Japan and US economies, the largest importers of Indian shrimps, resulted in the prices plummeting to below $10.

The frozen shrimp exporters account for nearly 70 percent of the total Indian seafood exports.

INTERNATIONAL NEWS

POPULARITY INCREASES FOR FOOD IRRADIATION

The recent fatal anthrax attacks that have struck in the United States appear to be increasing public support for the irradiation of food, a Rooster News Network story reports. With the technology now being used to eliminate anthrax spores in contaminated mail, the concept is getting more attention for use in safeguarding food.

A telephone survey by research firm Porter Novelli found that 52 percent of consumers said the government should require irradiation to ensure a safe food supply. About two thirds (64 percent) of the consumers who took part in the survey expressed concern about the contamination of the U.S. food supply with anthrax or other biological agents.

The Food and Drug Administration (FDA) has determined that food irradiation is safe and effective in decreasing or eliminating harmful bacteria and has approved irradiation of a variety of foods, including meat, poultry, fresh fruits and vegetables, and spices. The process requires exposing food products to ionising energy for a specified length of time.

Irradiation has the ability to make food safer by destroying harmful microorganisms that can cause food to spoil and cause illness. Its use can help reduce or eliminate health threats from such pathogens as salmonella, campylobacter, e.coli 0157:H7 and even anthrax.

UK LEADS EUROPEAN ORGANIC MARKET

Sales of organic food in the UK are rising faster than in any other European country, according to a new report by the Soil Association, the UK's leading organic certification and campaigning body.

The retail market for organic food reached £802m (1,296m euros) in the last year, up from £605m (977m euros) in the previous 12 months and three-quarters of households made at least one organic purchase.

In addition, the area of fully organic land has more than doubled (from 103,000 hectares to 240,000 hectares) and the number of companies licensed to produce organic food has risen to 1,675 — an increase of over 50 percent.

However, The Organic Food and Farming Report 2001 – the most comprehensive annual survey of the UK organic sector – warns that although the overall market is blossoming, many organic farmers desperately need support from Government, retailers and consumers.

Imports account for around three-quarters of organic food sales, at a time when many UK organic farmers are struggling to find outlets for their produce, particularly milk and beef. Despite the buoyancy of the retail sector, farm gate sales are worth just £100m (161m euros).

The report also expresses concern that supermarkets have increased their dominance of the organic market, at the expense of independent retailers and farm shops.

British supermarkets now have the highest organic food sales in Europe, accounting for 80 percent of domestic sales. In contrast, sales through farm shops have decreased by 6 percent and the market share held by independent retailers has dropped by 2 percent.

GINGER SUPPLEMENT TO HELP ARTHRITIS PAIN

Ginger could be an effective treatment for arthritis, according to a recent US research.

In a recent clinical trial a pill containing extracts of the root spice has proved to be as effective as conventional painkillers. Scientists at the University of Miami Medical School tested a highly-concentrated ginger supplement on 250 people with osteoarthritis, each suffering from moderate to severe pain.

Over a six week period, some were given a 255 milligram dose of the dietary supplement twice a day. The rest were given a placebo. The results revealed that two-thirds of those given the ginger pills reported relief from pain-significantly more than those taking the placebo.

The scientists stressed that more research was required to fully explore the effect of ginger on arthritis. Osteoarthritis is the commonest form of joint disease and is generally considered to be due to "wear and tear" of the joints leading to damage of the joint surfaces which gives pain on movement.

FISH OIL TO CURE MENTAL DISORDERS

Scientists think they have evidence that fish oil could cure mental disorders such as depression and dyslexia - conditions increasingly common in the Western world.

This is a breakthrough in the managing of individual depressions, according to Alexandra Richardson, Senior Neuroscience Research Fellow at Britain's University of Oxford. If the brain does not have the right fats, it will not be working right.

The right fats to beat the blues are large amounts of Omega-3 fatty acids, found in oily fish such as salmon and mackerel.

Richardson's research found that the lack of these fats – which are needed for the normal development and functioning of brain cells – causes depression, autism, dyslexia and ADHD (attention-deficit hyperactivity disorder) in some people.

High levels of stress, alcohol, nicotine and caffeine consumption can further decrease the levels of fatty acids, aggravating or even creating mental disorders, Richardson said.

She believes there is a link between the dramatic increase of depression and changing eating patterns in the West.

In countries where people eat less fish the increase in the incidence of depression is higher than in, for instance, Japan where fish consumption remains high, Richardson said.

She said everyone could benefit from increasing their intake of Omega-3 fatty acids. There is little to lose, there are hardly any side-effects.

CRANBERRIES, THE TOP ANTIOXIDANT SOURCE

Scientists at the University of Scranton in the US carried out a comprehensive investigation of the quantity and quality of antioxidants in fruits. The comparison found that cranberries contained the highest quantity of disease-fighting phenols, a type of antioxidant that is thought to reduce the risk of chronic diseases such as cancer, stroke and heart disease.

Lead researcher Joe Vinson measured the total phenol content in each of 19 fruits commonly consumed in the American diet. Gramme for gramme, cranberries had the highest phenol content. On the basis of serving size, cranberries also ranked first, he said.

In particular, the phenol content of cranberries was five times that of broccoli, according to the researcher. But he cautions that you may not want to ignore broccoli. It and other cruciferous veggies contain sulforaphane, a chemical that has been shown in recent studies to be better at fighting certain kinds of cancer than other

food chemicals.

Vinson and his associates are now conducting animal studies to determine if the high antioxidant levels of cranberries protect against the development of atherosclerosis, or hardening of the arteries. a condition that can lead to heart attacks and strokes.

The cranberry is one of North America's three native fruits that are commercially harvested.

OATMEAL IMPROVES COGNITION

Children who eat oatmeal as opposed to cold cereal or no breakfast at all perform better on memory tasks, according to new research findings announced at the Society for Neuroscience 31st Annual Meeting in San Diego recently.

Conducted by Tufts University this is the first U.S. study to compare the effects of eating two different breakfast foods, versus no breakfast, on cognitive performance in young children.

The study found that complex tasks are most affected by the difference in breakfast foods. More than two-thirds of the children performed better on tasks of spatial memory, important for maths and geography skills, when they ate oatmeal compared to those who had not eaten breakfast.

"Oatmeal's whole grain, high fibre and protein attributes are believed to be some of the primary factors in increasing spatial memory performance in young children," said Robin Kanarek a professor, and one of the leading investigors. "These nutritional attributes help delay digestion and promote a slower and prolonged release of glucose in the blood system. The improved performance with oatmeal suggests that this process may enhance cognitive performance because the brain is dependent on a constant supply of glucose to satisfy its energy demands."

A PEG A DAY KEEPS THE HEART IN SHAPE

Light to moderate alcohol intake may slow age-related stiffening of the arteries according to research presented at the American Heart Association's Scientific Sessions 2001 conference. The study, co-authored by Dr. Jerome L. Fleg, staff cardiologist at the National Institute on Aging, Gerontology Research Center in Baltimore, showed that while arterial stiffness increased with age no matter what, it rose slower among patients, especially older patients, who imbibe fewer than 10 drinks a week. But the study also found that heavy alcohol consumption can be harmful.

Modest alcohol consumption has been associated with reduced cardiovascular morbidity and mortality, Dr Fleg said.

The arterial stiffness index in each age group – younger than 50, age 50 to 70 and over the age of 70 – was lowest for light to moderate drinkers, who drink between 1 and 10 "units" of alcohol a week. A single unit of alcohol was considered a four to five ounce glass of wine, a 12-ounce glass of beer or two ounces of hard liquor. Numerous studies have shown that more than two drinks a day exerts more negative than beneficial effects on cardiovascular health.

Arterial stiffness of the nondrinkers and heavy drinkers was about 10% to 20% higher than that of the light to moderate drinkers. The data also showed that this beneficial effort of alcohol was greatest at older ages.

Recent studies have shown that higher arterial stiffness, particularly in cardiovascular patients, predicts increased risk of death or cardiac events. Additional studies are needed to determine whether lowering stiffness by lifestyle changes or medication will reduce cardiovascular risk.

LACTOSE-FREE MILK DEVELOPED

Finland's largest dairy has launched a special milk, targetted at the millions of people around the world suffering from a condition that prevents them drinking regular milk. The new milk developed by 'Valio', which has a strong pedigree in functional dairy products, has no lactose – a milk sugar which prevents some from using dairy products and affects tens of millions of people in Western Europe alone. While

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MILK IS GOOD FOR SLIMMERS

The growing trend to gulp down milk-based, calcium-rich drinks may not only be beneficial to bones, according to new research it may also help keep weight in check. A study published in the International Journal of Obesity revealed that higher intakes of calcium were associated with lower body fat measurements. Recently, an analysis of American food survey data showed a strong relationship between the relative risk of being obese and the amount of calcium consumed in the diet. Dr. Michael Zemel, Professor of Nutrition at the University of Tennessee, set to work to pinpoint a possible mechanism for this apparent relationship between calcium intake and weight. Dr. Zemel was already aware that as levels of calcium fall in the blood, the amounts of two other substances, vitamin D and parathyroid hormone (PTH), increase. He was able to show that when vitamin D and PTH are raised around isolated human fat cells under laboratory conditions, the fat cells stored more fat. Conversely, as calcium around the fat cell increased and vitamin D and PTH fell, fat cells were more likely to release their fat.

CHOCOLATE — PATH TO HEALTH

Good news for chocoholics. The treat favoured by millions not only tastes delicious but is healthy, according to American researchers. Chocolate contains compounds called flavonoids that can help maintain a healthy heart, good blood circulation and reduce blood clotting – which can cause heart attacks and stroke. More evidence is found that consumption of chocolate that is rich in flavonoids can have positive cardiovascular effects according to, Mr. Carl Keen, a Nutritionist at the University of California, Davis. There is an increase in antioxidant capacity after chocolate consumption, and also modulation of certain compounds which affect blood vessels. Antioxidants reduce the damage of cancer-causing charged particles in the body. Mr. Keen and his colleagues measured the impact of chocolate on platelets in the blood. Platelet activation is considered a big risk factor in blood clotting. The researchers collected blood samples from volunteers who ate 25 grams of chocolate with a high flavonoid content and other volunteers who ate bread. Volunteers who consumed the chocolate had lower levels of platelet activity, while the scientists found no change in the group that ate the bread.

TURMERIC COULD BE A CURE FOR ALZHEIMER'S

The humble 'haldi' or turmeric, a basic ingredient in Indian cuisine, may be effective in the treatment of Alzheimer's disease, say researchers from the University of California in Los Angeles.

A spicy ingredient of many Indian curries, turmeric has some power to control the spread of Alzheimer's a neuro-degenerative disease which is quite common in the US. The finding helps to explain why rates of Alzheimer's are much lower among the elderly in India than in their western peers.

A team from the university of California believes turmeric may play a role in slowing down the progression of Alzheimer's which is linked to the build of knots in the brain called amyloid plaques.

Turmeric which is used in everything from mild kormas to lentils to the hottest vindaloos, reduced the number of these plaques by half.

The crucial chemical is curcumin, a compound found in the spice. Previous studies have found Alzheimer's affects just one per cent of people over the age of 65 living in some Indian village. Researchers also found that turmeric had other health benefits. It aids digestion helps fight infection and guards against heart attacks.

OLIVE OIL

Among the Mediterranean people, the olive tree has for centuries been apraised for its exquisite golden oil, tasty fruit, its amazing health benefits, and for the divine air that filters through its branches.

Westerners have only recently developed a palate for olive oil; however, to many Arabs, olive oil is a necessity.

Olives are the major crop in the West Bank yielding upto 25 percent of the gross agriculture income, according to the Applied Research Institute (ARI).

Olive trees have a long life. Even when its trunk and branches may die, the olive trees sprouts once again bringing life into a new tree. Today it is estimated that approximately 800 million olive trees thrive on earth with approximately 400 different varieties of olive trees cultivated worldwide.

Olive oil can be used to aid in lowering blood pressure and cholesterol levels, add shine to hair, soothe aching muscles, heal abrasions, as well as countless other remedies.

West bank olive oil is extra virgin oil obtained by mechanical cold pressing of the olives without chemicals and has all of the health benefits, flavor, and aroma attributed to olive oil. There are about 300 presses in the West Bank, according to ARI.

The world consumes almost two million metric tons of olive oil per year. The global oil and olive business is a near $10 billion industry.

The best olives in the world are found in Morocco and the best olive oil is found in Palestine. Today Spain is the largest producer of olive oil, followed by Italy and Greece. Other major producers include France, Turkey, Tunisia and Morocco.

LOW-FAT FRENCH FRIES FROM RICE

Scientists at the US Agriculture Research Service (ARS) are cooking up a new kind of french fry for health-conscious consumers who can not resist the fast-food favourite. Because the fries are made from rice flour mixtures, rather than potatoes, they absorbs less fat during cooking. Rice is also hypoallergenic, nutritious and easily digested, and it stores well, the ARS comments.

According to the ARS, the fries are made with broken and immature/thin rice kernels, which fetch a lower price than regular whole rice. The method processes rice flour mixtures into fries with texture, cooking and other properties that closely mimic potato fries.

In tests, the rice fries generally absorbed 25-50 per cent less fat from oil during cooking than potato fries. They could also be made into a "functional food", the ARS claims, since they can be fortified with vitamins, minerals, protein and other nutrients. The US Department of Agriculture filed for a patent on the process. Now, the ARS researcher and collaborators with Rishellco, Inc., are consulting with U.S. rice processors on ways to commercialise the fries.

In related work, the researcher is experimenting with a whole-rice bread for individuals with celiac disease, an intolerance to the wheat protein gluten that affects one to two percent of the U.S. population.

TESTS FOR MICROBIOLOGICAL QUALITY OF RAW MILK

Scientists from the Food Engineering Department at Kasetsart University, Thailand carried out a series of tests including the monitoring of dissolved oxygen levels and changes in the colour of raw milk with time in a slightly modified methylene blue test using 16 ppm of dye concentration.

The initial bacterial population in raw milk determined by standard plate count could be estimated with coefficients of determination (r2) of about 0.697 and 0.613 from the respective normalized voltage outputs of the dissolved oxygen probe and light-sensing probes at selected time interval in less than 1 hr.

However, the researchers report, a comparison of experimental and estimated initial bacterial population in raw milk showed correlation coefficients (r) of about 0.754 and 0.616 for the dissolved oxygen probe and light-sensing probe, respectively.

They concluded that the results clearly indicated the potential and need for improving such empirical models for grading milk with both types of probes.

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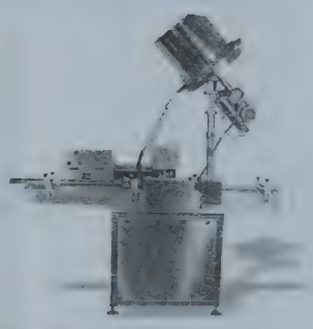

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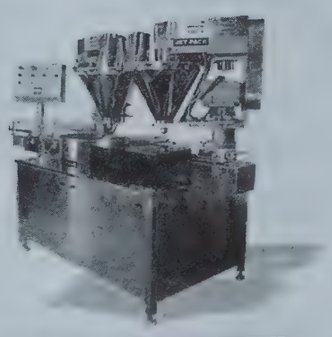

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If your technical/marketing personnel wishes to contribute an Article or Technical paper relating to Food & Beverage processing, we would be happy to publish it. The Articles should be of a general nature, not specially promoting products of your company

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We have special issues scheduled during the year (as under) and we invite relevant original articles/ research papers for publication in them.

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The closing date for receipt of the articles/research papers is the 15th day of the month preceeding the special issue.

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INDIAN
TRADE FAIRS & CONFERENCES

AGRI EXPO 2002
Venue: Paldi, Ahmedabad
Date: 3-6 January, 2002

Agri Expo 2002 will showcase the products and services focused at the most important element of the region's economy, 'the farmer'.

It will provide an excellent platform to manufacturers and distributors of agricultural inputs to showcase their products and services and to interact with one of the most enterprising, progressive, and prosperous farmer communities of the country.

Leading lights in the fields of Agriculture, including agroforestry and animal-husbandry, and also the agro-machinery industry as well as companies providing agricultural inputs like fertilizers, pesticides, insecticides will participate in the exposition.

Main Objectives of Agri Expo 2002:
• Developing the market for technocrats and manufacturers of various raw materials used in agriculture by interaction with farmers • To understand the problems of farmers in cultivation and solve accordingly • Providing the practical education to the farmers • Updating the Indian economy • Providing A Super market of Agriculture inputs to the farmers.

Agri Expo 2002 will attract more than 100,000 farmers from all over Gujarat.

For more details contact:

Garima Communication, 12, Kajal Kiran, Srimali Society, Opp. Jain Derasar, Navrangpura, Ahmedabad 380 009. Tel: 644 6186, 640 0900, Fax: 079-642 3108.

AGRI EXPO 2002
Venue: Lucknow
Date: 15-18 Jan., 2002

Organised jointly by Centre for Agriculture and Rural Development and the Associated Chambers of Commerce & Industry of India, Agri Expo 2002 offers a great business opportunity to the exhibitors to showcase products, services and technologies to potential buyers and users. This would also help establish contact with the government agencies and prospective investors, identify business opportunities and forge strategic alliances with agribusiness organisations. It would provide a unique opportunity for the agribusiness and consumer products companies to exhibit their products and directly communicate to a large number of potential customers, government officials and business associates. About 1.0 lac rural and 25,000 urban visitors are expected to visit AgriExpo 2002.

For more details contact:

AgriExpo 2002, G-30, Lajpat Nagar-II, New Delhi 110 024. Tel: 6910927, 6910928, 6316747, Fax: 6849107, 6922747, Email: agricult@del3.vsnl.net.in, Website: www.card.org.in

ANDHRA AGRI.COM 2002
Venue: Vijaywada
Date: 24-27 Jan., 2002

Organised by Green Cross Media Pvt. Ltd. and sponsored by Agri Gold, Andhra Agri.com 2002 will be a Hi-tech Agri Trade Fair.

It will be first of its kind of Agricultural exhibitions in Southern part of India. Andhra Pradesh, the land of multiclimatic regions is a leading state in growing many crops like Paddy, Tobacco, Chillies, Turmeric, Pulses, Sugarcane, Oil Palm and variety of Fruit crops including Mango, Citrus etc. With the added touch of high-tech atmosphere created by the dynamic Chief Minister Shri. N. Chandra Babu Naidu, the agricultural scenario in Andhra Pradesh in general and coastal belt in particular is bouyant. It is needless to say that business opportunities here in agricultural and allied activities like Bio Technology, Food Processing, Aquaculture, Poultry and Dairy, Agricultural Equipments etc., is highly conducive. The region of Andhra Pradesh all along the Coramandal Coast, consisting of highly progressive and enterprising farming community, is well known for innovative agriculture where agriculturists are receptive to new ideas, methods and technologies.

The fair will provide an ideal platform for manufacturers and distributors of agricultural products to forge strategic alliances with agribusiness organisation. The fair will give an opportunity for interaction between farmers, traders and government departments.

For more details contact:

Green Cross Media Pvt. Ltd., 274, V.R. Manor, 100 Feet Road, Indiranagar, Bangalore 560 038. Tel/Fax: 080-

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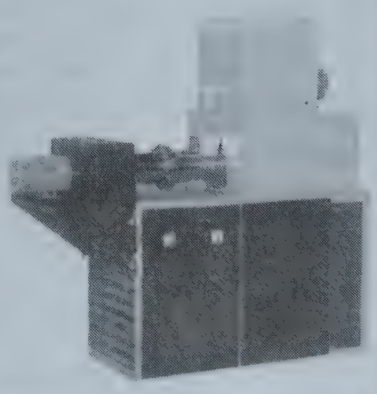

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KRISHI INDIA 2002
Venue: Tiruchirapalli
Date: 6-11 Feb., 2002

Krishi India 2002 jointly organised by Tiruchirapalli District Tiny Small Scale Industries Association and Tamil Nadu Agricultural University, enjoys the support and partonage of various Government Departments, Associations, Institutes and private organisations. Krishi India is poised to attract about 150 participants from all over India. About 2,00,000 Farmers, Entrepreneurs, Traders and other important visitors are expected to visit the exhibition.

The objectives of the fair is to emphasise in identifying and adopting suitable practice; a platform for interaction between the Farmers, Traders & Government Dept; give priority, support, promote and encouragment to emerging potential and latest technology; dissemination of techniques and improve productivity to global standards; to make the farmers more innovative for judicious use of natural resources like land, water, climate etc; Buyer-Seller meet; to bring together farmers, technologists, Research Institutes, Manufacturers of various Agriculture products, Marketing, Finance and other Agricultural produces.

Exhibition Profile: • Agriculture, Horticulture, Floriculture• Fertilizers, Pesticides, Plant Nutrients, Insecticides, Seeds • Agriculture Tools, Implements, Equipments, Farm Machineries • Drip & Sprinkler Irrigation Systems, Pumps, Pipes • Animal Husbandry, Dairy, Poultry Feeds & Products • Fisheries, Aquaculture, Farming Systems, Veterinary • Green Houses, Planting Materials & Accessories • Tissue Culture, Sericulture, Agro Forestry • Food Processing & Storage Systems, Food & Nutritions • Bio-Technology, Post Harvest Technology, Non Conventional Energy, Mill Equipments, Packing Materials • Herbal and Medical Plants & Produce • Agricultural Marketing, Finance, Govt. Departments, Research & Educational Institutional, Home Science • Publications, Nurseries & Artificial Flowers etc.

For more details contact:

Krishi India 2002, C-1, Parsn Brigade, Ground Floor, 5A Reynolds Road, Cantonment, Tiruchirapalli 620 001. Mobile: 98430 - 81561

DAIRY INDUSTRY CONFERENCE/ EXHIBITION
Venue: Nehru Centre, Worli
Date: 7th-9th Feb., 2002

The Indian Dairy Association has organised the XXXI Dairy Industry Conference. This conference will provide an opportunity to share the views and experience of leading professionals and organisations engaged in dairying and its allied activities, and participate in formulating future strategies. In addition to four technical sessions spread over two days, there will be a separate session for the farmer delegates to express their view on meeting the future challenges in the market. The Maharashtra State Co-operative Dairy Federation will be the main sponsor of this conference.

The conference will make the beginning of extending the horizons of Indian Dairy Association to SAARC countries for strengthening the regional co-operation.

An exhibition will be organised at Nehru Centre as part of the conference to provide an opportunity to the manufacturers of various products, equipment and service providers etc. related to dairy industry for direct interactions with their clients.

For more details contact:

Secretary General, XXXI Dairy Industry Conference, C/o. National Dairy Development Board, Near Mahanand Dairy, Western Express Highway, Goregaon (E), Mumbai-65. Tel: 8403336, Email: xxxidic @bom.nddb.ernet.in, Fax: 022 8402122

INTERNATIONAL FOODTEC INDIA 2002
Venue: Chennai Trade Centre
Date: 9-12 February, 2002

Confederation of Indian Food Trade and Industry (CIFTI) was set up by FICCI in 1985, to cater specifically to the needs of Food Industry and Trade. Today, it is the apex body of food industry in the country providing institutional support to food trade, hotel industry and processed food industries manufacturing almost all types of food and allied products including the affiliated sectors like packaging, machinery, seed development etc.

CIFTI is the only Indian Sponsor and the organization of the event, International FoodTec India 2002 in India and will be directly co-ordinated by CIDEX, the Indian, subsidiary of Köln Messe International and Messe Düsseldorf, a joint venture initiative.

The fair will be organized concurrently with INDPACK 2002 International and INDPRINT 2002 International, India's most renowned packaging and printing fairs focussing on Packaging Materials, Auxiliary Materials, Packaging Products & Components, Packaging Machinery, Converting Machinery, Printing and Allied Machines, Labelling and Coding Systems etc., which also has a huge role to play in the food processing sector.

CIFTI will also organize technical seminars on topical issues during the event, which will be addressed by the experts from their respective field. There will be a special Indian Processed Food Pavillion.

The exhibition's focus will be to present the latest developments and trends in the fields such as: • Processing Technology • Packaging Technology • Ingredients like aromas, enzymes, extracts, food preservatives, fruit products, powders, concentrates, starter cultures • Logistics / Production Transportation • Measuring and Regulation Systems • Analytics.

For more details contact:

Confederation of Indian Food Trade and Industry, Federation House, Tansen Marg, New Delhi 110 001. Tel: 011-3736305, 3738760 – 70 (11 lines), Fax: 011- 3320714 / 3721504, Email: ciftinfo @vsnl.net, Website: http://www.food techindia.com

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BEVTECH/BREWTECH 2002
Venue: Mumbai
Date: 7 - 9 March, 2002

India is a ready market for a large number of world's leading brands of alcoholic and non-alcoholic beverages. Breweries, distillers and beverage manufacturers are either expanding the existing facilities or setting up new plants.

Against this backdrop Intech Trade Fairs Pvt. Ltd. have organised Bevtech/Brewtech 2002 which will be valuable for those business entrepreneurs who are considering partnership with Indian companies or are considering marketing products and services to Indian customer. It provides the right opportunity to suppliers of raw materials, ingredients, machinery and equipment to show case their products and services.

Concurrent to the exhibition, international conference will be held featuring applications of emerging technologies and current trends and opportunities in Indian industry. This conference will enhance the synergy effect and attract top level professionals from the industry, and visitors improving the technology focus, content and visitor profile of the event.

Exhibition Profile: • Raw materials and ingredients • Plant and equipment for Mineral Water Production, Soft-drink Production, Beer Production, Malting Spirits Production, Wine making • Filtration and Separation • Pasteurizing and Heat Treatment • Cleaning and Filling Machines for Bottles, Cans and Crates, Kegs, Casks and Containers • Capping and Sealing Equipment • Filling Machines for Soft Packs • Containers • Labelling Machines • Packaging and Depalletizers • Material Handling Equipment • Inspection and Sorting Equipment • Process Control and QC Equipment • Air Conditioning and Refrigeration • Waste Disposal and Recycling • Auxiliary Equipment and Services • Bar Fittings and Dispensing Equipment • Technical Publications.

For more details contact:

Intech Trade Fairs Pvt. Ltd., 307-308, 3rd Floor, Acme Industrial Park, Off. I.B. Patel Road, Near Western Express Highway, Goregaon (E), Mumbai 400 063. Tel: +91-22-8780370/71/72, Fax: +91-22-6902392/93, 8780375, Email: intech@ bom5.vsnl.net.in

INTERNATIONAL
TRADE FAIRS & CONFERENCES

HONG KONG INTERNATIONAL FOOD FAIR
Venue: Hong Kong
Date: 24-27 January, 2002

Hong Kong International Food Fair, organized by Neway International Trade Fairs Ltd., will make its debut from Jan 24-27, 2002 at the Hong Kong Convention and Exhibition Centre. This premier event will provide a superb opportunity for local and overseas manufacturers, suppliers, agents, distributors and franchisers to get in touch with potential buyers and business partners from Hong Kong and all over the world. The fair will be the best place to explore new markets, exchange ideas as well as promote new and existing brands.

Widely recognised as the "Gourmet's Paradise", Hong Kong is the only place where the most diversified and finest Western and Oriental foods are found. Located at the centre of Asia, Hong Kong has always been the perfect location for trade and business development for the food industry. Hong Kong is also a major distribution centre in Asia and China.

The forthcoming food fair will feature new products in different Thematic Zones. Highlights will include the "Green Food", "Health Food" and "Sweets & Bakery" Zones etc. Over 15,000 quality visitors from Hong Kong, China and different parts of the world will attend The Hong Kong International Food Fair.

For more details contact:

Neway International Trade Fairs Ltd., 9/F, Fortis Tower 77, Gloucester Road, Hong Kong. Tel: 852-2561-5566, Fax: 852-2811-9156, Email: info@neway-fairs.com, Website: http//www.neway-fairs.com

INTERNATIONAL SWEETS & BISCUITS FAIR
Venue: Germany
Date: 27-30 January, 2002

Organised by KölnMesse GmbH the International Sweets Biscuits Fair will present a comprehensive range of confectionary and snack items.

Manufacturers and importers will present a complete overview of product groups like: chocolate, sugar confectionery, fine baked goods, snack products, ice cream and raw pastes. Only those end-products destined for the retail trade are on display.

The fair is open to buyers from the retail and wholesale trade of confectionery, grocery and cooperative wholesale trades, the trade chains and their regional branches, C+C companies, self-service department stores and consumer markets, health food wholesalers, drug store chains, specialist confectionery retailers, cafes, confectioners, bakeries, filling station buying centres and filling station chains.

About 1500 companies from 70 countries are expected to participate at this exhibition.

For more details contact:

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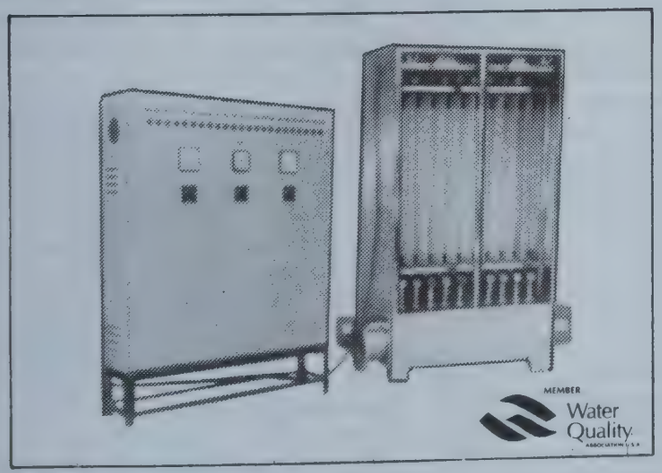

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Innovative Solutions Today
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BIOFACH
Venue: Nürnberg, Germany
Date: 14-17 February, 2002

BioFach 2001 saw the euphoric mood over the extraordinary rise in demand for organic products. The next opportunity to get information about international range of organic food and natural products will be BioFach 2002 at the exhibition centre in Nüremberg from 14th-17th February, 2002. The country of the year will be Spain which will present attractive products and its culture. Over 1725 exhibitors are expected to take part and more than 25,000 trade visitors are expected.

Products on display: ★ **Organic food:** • Raw materials and supplements • Semi-prepared products • Corn, pulses, muesli • Fruit, vegetables, dried fruit • Sugar cane, sugar, honey • Oils for cooking and dressings, Soya products • Milk and dairy products • Meats and sausages • Fish and seafood • Bread, baked goods, spreads and pates • Confectionery, fairnaceous products, eggs • Herbs, spices, soups, sauces • Convenience products, tinned goods • Frozen food, ice cream • Health food, delicatessen, baby food • Food supplements, macrobiotics • Wine • Beer, sparkling wine, spirits • Tea, coffee, cocoa • Juices, soft drinks, mineral water. ★ **Natural cosmetics** ★ **Natural textiles** ★ **Other natural products** ★ **Organic farming and marketing** ★ **GreenFinance**

For more details contact:

Indo German Chamber of Commerce, Maker Tower, E, 1st Floor, Cuffe Parade, Mumbai 400 005. Tel: 2186131 / 2186118, Fax: 218 0523, Email: ruby@indo-german.com

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HOTERES JAPAN 2002
FOODEX JAPAN 2002
Venue: Tokyo, Japan
Date: 12-15 March, 2002

Foodex Japan 2002, the 27th International Food and Beverage Trade Show, will be held at Nippon Convention Center from March 12 to 15, 2002. Foodex Japan enjoys the reputation of being the No. 1 event in the Asia Pacific Rim. Foodex Japan provides essential business opportunities to penetrate the vast Asian market and for business expansion in Asia.

Hoteres Japan, which runs concurrently with Foodex Japan, is Asia's largest equipment, systems, and services exhibition for the hospitality industry. And for Hoteres Japan 2002, the 30th International Hotel & Restaurant Show, some 80,000 visitors are expected to attend the show.

India will also participate in the Foodex '2002 exhibition and the products on display will be Agricultural Products, Processed Food & Beverages, Meat & Poultry products, Marine products, Confectionary and Desserts, Tea, Coffee and other drinks Herbs and Spices, Dairy Products, Books, Magazines and Newspaper.

For more details contact:

The Secretariat of Hoteres Japan / Foodex Japn, Japan Management Association, Convention Div., 3-1-22 Shibakoen, Minato-ku, Tokyo 105-8522, Tel: 81-3-3434-3453, Fax: 81-3-3334-8076, Email: convention@hoteres.jma. or.jp, concention@foodex.jma.or.jp

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FOODTECH GROUP SHOW 2002
Venue: Istanbul, Turkey
Date: 21-24 March, 2002

Foodtech Group Show is organised by FGS Fuarcilik the Turkish partner of Royal Dutch Jaarbeurs. This show has three specialist food exhibition: Foodtech, Food Ingredients & Additives and Food Pack under combined title of Foodtech Group Show. The fair covers Food processing machinery and equipment, Food control and testing systems, Software, Quality Control, Lab Equipments, Automation and Control systems, Cooling and Airconditioning systems, Waste processing and Environmental systems.

The Foodtech Group Show encompasses the most vital aspects of the food industry and will once again be the essential meeting place for the sector. There will be approximately 550 companies exhibiting and in excess of 6000 visitors to the fairs and about 6000 visitors are expected to visit the show.

For more details contact:

FGS Fuarcilik A.S. Ms. Selin Akpinar – Press and Public Relations Manager. Tel: +90 212 282 88 08, Fax: +90 212 281 2713, Email: selin@fgsfair.com.tr

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PROWEIN 2002
Venue: Düsserdorf, Germany
Date: 24-26 March, 2002

ProWein 2002 will showcase the entire world of wines and spirits from 24-26 March in Düsseldorf, again featuring nearly every wine producing country on earth.

More than 1,000 exhibitors from 27 nations will be participating. A perennial feature of ProWein is the international tasting programme organised by Messe Düsseldorf in cooperation with publishing house Meininger Verlag, Germany.

For more details contact:

Monika Kissing/Tanja Karl, ProWein 2002 Press Office. Tel: +49 (0) 211 / 4560 543 / -465, Fax: +49 (0) 211 / 4560-8548, Email: kissingm@messe-duesseldorf. de / karlt@messe-duesseldorf.de

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PETPOINT
Venue: Essen, Germany
Date: 23-27 April, 2002

The first International Exhibition PET POINT forPET bottles, closures, crates and filling equipment will be held at Essen from 23rd – 27th April, 2002. This exhibition will run parallel to MET PACK and coinside with INTERPACK.

PET point's group stands are dedicated to recycling, dairy products, and special solutions in preforms, bottle design, closures, and labels.

The first world congress for PET is conceived as a promotion device for PET as well as the chance to exchange views and experience. Competent experts will deal with relevant topics such as technology and marketing.

Until now the suppliers of these various pieces of equipment were to be found at some widely differing exhibitions, with there being no central forum for the PET industry. At PET POINT we now intend to fill that gap, and present PET packaging in all its varied aspects. Large and small suppliers from around the world will be getting together to show their products at the first exhibition of its kind.

Exhibition Profile: • Materials for bottle and cap production • Packaging components and accessories • Raw materials for beverage production • Preform production • Bottle production • Cap and crate production • Ancillary equipment for the production of preforms, caps and crates • Moulds • Materials and accessories for moulds • Bottle handling and preparation • Beverage preparation • Filling machines • Labellers and capping machines • Downstream equipment • Recycling • Laboratory equipment • PET consultancy and support services • Contract manufacturers.

For more details contact:

PET planet PUBLISHER GmbH, Haus Isenburg, 58566, Kierspe. Tel: +49-2359-2996-0, Fax: +49-2359-2996-10, Email: brangenberg@petpla.net

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METPACK 2002
Venue: Essen, Germany
Date: 23-27 April, 2002

Metpack 2002 organised by Messe Essen GmbH will provide an unparalleled opportunity for delegates to experience the latest developments, hear what's next in materials, equipment, and processes, and discover new strategies that will enable them to remain competitive and enter new and explosive growth markets in metal packaging.

MetPack provides showcase for equipment suppliers; for metal suppliers to examine new developments that will enable them to supply superior materials; for canmakers to compare the merits of new technologies and processes now available; and, most importantly, to provide on open and focused forum for industry professionals from around the globe to meet. Metpack 2002 will run parallel to Pet point.

For more details contact:

Messe Essen GmbH, Postfach 100165, D-45001 Essen. Tel: +49(0)201 72 44-5 32, Fax: +49(0)201 72 44-15 32, Messe-Info +49 (0) 18 05 22 15 14, Email: fey@messe-essen.de, Website: metpack.de

PRODUCT REVIEWS

SODIUM BENZOATE (FOOD GRADE)

Ganesh Benzoplast (GBL) manufactures sodium benzoate (food grade) as per IS:4447-1994 in computerised state-of-art plant at Tarapur, GBL is ISO-9002 company, and exports to U.S.A., U.K., France, Germany, Australia and many developed countries. GBL caters to the need of COCA-COLA and PEPSI. Sodium Benzoate is available in powder as well as granular form. It is recommended by PFA in jam, jelly, soft drinks, syrups, beverages, sauces, tomato puree, chutney, pickles, fruit pulp and various other food products.

Fumaric Acid (Food Grade) from Ganesh Anhydride Ltd., (GAL) is manufactured at Tarapur. It is being used as an acidulant in various food products. It replaces citric acid. GBL also manufactures. Benzoic Acid (Food Grade).

For more details, contact:

Ganesh Benzoplast Ltd.
Ganesh House, Makwana Lane
Off. Andheri-Kurla Road, Marol Naka
Andheri (East), Mumbai 400059
Tel: 91-22-8593252, 8593253, 8593250
Fax: 91-22-8504412
Email: rkp1@vsnl.com

ULTRA PURE WATER

Ultra Pure comes from Aqua Filsep, Inc., one of the leading manufacturers of water and waste water treatment equipment in India. Aqua Filep, Inc. is a pioneer in putting R.O. technology to innovative use in various industrial applications. Backed by extensive experience and world class parts procured from associate world-wide, Ultra Pure offers never before features for an output water quality equivalent to mineral water.

Ultra Pure uses world class spiral-wound membranes to separate and remove dissolved solids, organics, pyrogens, submicron colloidal matter and bacteria from water. Feed water is delivered under pressure of approximately 125 psi through the membrane. Water permeates the minute pores of the membrane and is delivered as purified product water. Impurities in the water are concentrated in the reject stream and flushed to drain. Reverse Osmosis is capable of removing 90-95% of the total dissolved solids (TDS) and 99% of all bacteria, thus providing safe, pure water which is not possible with other purifiers based on UV or Ozone technology.

For more details, contact:

Aqua Filsep; Inc.
7, Retiwala Industrial Estate
H.A. Palav Marg, Byculla (E)
Mumbai 400 027
Tel: (O) 371 9455
Fax: 91-22-4465521
Telefax: 4465521
Email: filsep@vsnl.com
Website: http://www.aquafilsep.com

REVERSE OSMOSIS SYSTEMS FOR WATER PURIFICATION

When we discuss "high purity" drinking water we are specifically talking about water for which virtually all types of unwanted contamination have been removed. This includes organic chemicals such as TCE, pesticides and all other carbon-based materials, inorganic salts such as sodium, metals, lime, nitrates, radioactive materials and biological growth such as bacteria.

Komal Industries is a water treatment manufacturer dedicated to offering their customers the finest commercial, industrial and medical Reverse Osmosis systems. They are committed to providing the most innovative and technologically advanced quality systems to their customers at reasonable technologically advanced quality systems to their customers at reasonable prices. Their knowledge and experience enables them to manufacture most of RO system's parts in-house to ensure quality system. Komal also tests every unit prior to shipping and supplies each customer with all the best data for their systems. Komal has a system suitable for both city water as well as highly contaminated brakish well/bore water. Wide range of standard systems are available. Komal manufactures small system for office/residential purpose to industrial RO having capacity ranging from 50 lit/hr. to 1700 lit/hr in standard models. Higher capacity RO are made as per the client's specific requirements on turnkey basis. Komal's dedicated and professional customer service and technical personnel are always ready to assist their clients in a timely manner with any questions on servicing or installation.

For further details, contact:

Komal Industries
108 Creative Ind. Centre
12 N.M. Joshi Marg
Lower Parel (E), Mumbai 400 011
Tel: 3091090/3091174
Fax: 022-3062711
Email: komal@komalwater.com
Website: www.komalwater.com

POWDER FILLING MACHINE

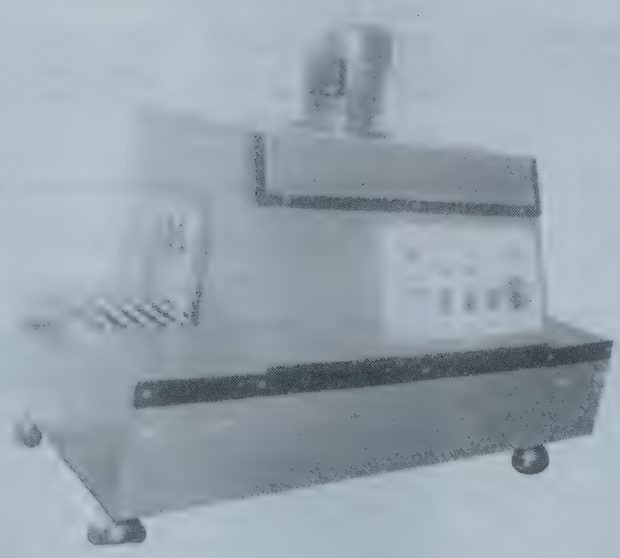
Automatic Devices are the pioneers in the manufacturing and designing of Semi-automatic and Fully Automatic Filling and Packing Machines. These machines find wide applications in industries such as Pharmaceuticals, Chemicals, Pesticides, Fertilizers and Food Processing. They design and manufacture custom-built machines to suit the individual needs and varied interests of customers. They design complete packaging systems (Semi or Fully-Automatic), material handling systems and conveying systems for turnkey projects which are also being exported to Africa, Bangladesh, Egypt, Gulf Countries, Nepal, Russia, Sri Lanka, etc.

The powder filling machine is an auger filler which is more suitable for filling powders which are free flowing like chilly powder, turmeric powder, powdered spices, cocoa, skimmed milk powder, masala powders, soft drink powders, food colours and pharmaceutical powders, chemicals like syrup and dyes. Auger filler is volumetric powder filling machine which is most suitable for filling free-flowing powders into any type of containers/ pouches. It is faster and more consistent when it comes to handling fine, free flowing powders, than weigh filler. The different models can cover a filling range from 100mgs to 500gms with filling speeds from 900 fills to 2,500 fills per hour. In this machine a vertically rotating auger or screw doses out the required quantity of powder directly into the pouch or the container. An electronic solid-state feed controller which is plugged into the machine, controls the auger revolutions and thus the dose. By interchangeable augers and funnels the filling range can be spread out nearly 10 times from minimum to maximum. The weight of the powder delivered is nett. The machine can fill into any type of container, Dusting is negligible when filling. The machine is simple to set up and run and occupies very little floor space. Production of over 10,000 fills is possible in a 6 hour shift.

For more details, contact:

Automatic Devices
105-A, Hind Saurashtra Industrial Estate
Andheri-Kurla Road
Marol, Mumbai 400 059
Tel: 022-850 1376, 850 9085
Fax: 022-859 3042
Email: autodevices@vsnl.com
Website: http://www.automaticdevices.org

SHRINK WRAPPING MACHINE



Advance Packaging a leading manufacturer of packaging machinery now offers a compact economical table top Heat Shrink Machine. Concentration of total resources has enabled them to develop an extraordinary under-standing of heat shrink technology and to design a wide range of shrink materials like PVC, LDPE, CRYOVAC etc.

Low cost, low noise operation, rod chain conveyor with rotating carrying rods and greater power saving is assured with outstanding shrinking performance.

For more details, contact:

Advance Packaging
17 Jaimataji Society,
Asalpha Link Rd.
Ghatkopar (West)
Mumbai 400 084
Tel: 5101665
Telefax: 022-5102915
Website: www.advancepackindia.com
Email: adpackage@vsnl.net
adpackage@yahoo.com

FRUIT PROCESSING MACHINERIES

Since 30 years M/s. Techno-Equipments has been manufacturing and supplying high quality Fruit Processing Machinery to leading Fruit Processors.

The high quality of the machine as per the specification given is due to the expertise and dedication of Food Technology/Engineering in this field.

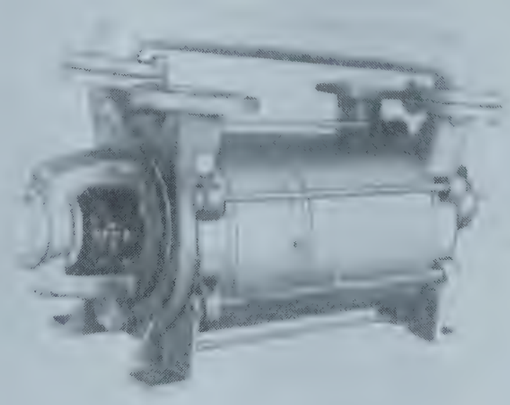
All machines are designed and fabricated under the supervision of Senior Technologists and experienced engineers, by maintaining strict quality control from procurement of raw material to the final assmbly under going rigid tests before it leaves the factory.

Techno-Equipments is manufacturing machines like exhaust-box, retorts, steam jackets kettles with/without anchor type stirrers, fruit pulpers, fruit mills, juice extractors, vacuum bottle fillers/washers, pineapple slicers and papaya cubers with s.s. tanks.

For more details, contact:

Techno-Equipments
9, Satyam Industrial Estate
Behind USV Ltd.
Off. B.K. Devashi Marg
Govandi, Mumbai 400 088
Tel: 5515640

LIQUID RING VACUUM PUMPS



The Acmevac range of Airovac Liquid Ring Vacuum Pumps are available in both-single and double stages. The sophistically designed Liquid Ring Pumps are silent in operation with the result that the silencer is totally eliminated. The drawbacks in the earlier models of Liquid Ring Vacuum Pump available in the country have been successfully eliminated.

The Mechanical Shaft Seals design ensures adequate protection to the expensive shaft and provides for ease of maintenance. This leads to minimal time required for servicing, thereby cutting down time to the barest minimum.

These Pumps are rugged in design, reliable in performance and easy to maintain.

For more details, contact:

Acmevac Sales Pvt. Ltd.
109 Unique House
Cardinal Gracious Road
Chakala, Andheri (E)
Mumbai 400 099
Tel: 022-8329647, 8375837/8381053
Fax: 022-8364977
Email: acmevac@bom3.vsnl.net.in
Website: www.selpages.com/ads/acmevac

POWERVAC

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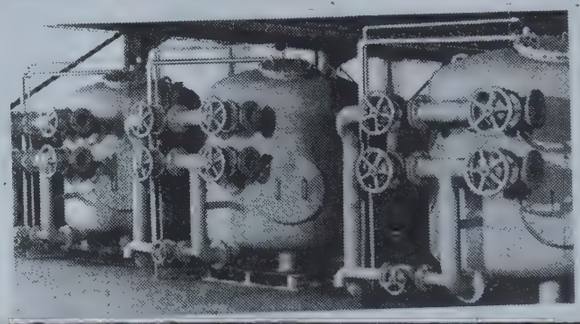

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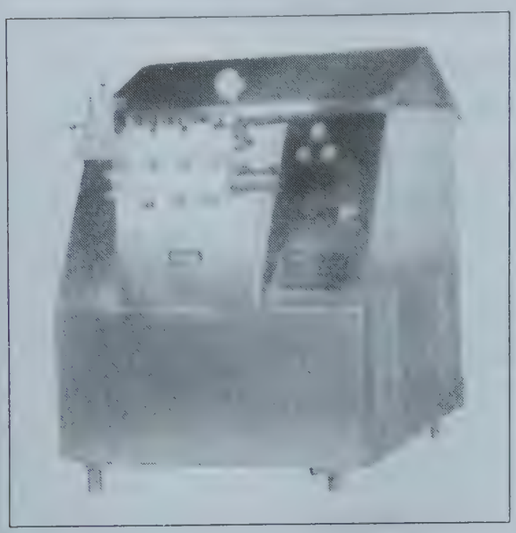
Ahmedabad: A1/1, Chinubhai Tower, Above 1.O.B, Opp. Handloom House, Ashram Road, Ahmedabad 380009. Tel: 91-79-6580047, 6584069 • Fax: 91-79-6584069 • Email: filsep@ad1.vsnl.net.in • Website: www.aquafilsep.com

HIGH PRESSURE HOMOGENISERS



Goma, an ISO 9002 company, developed the first 100 percent indigenous High Pressure Homogeniser which is certified and approved by National Dairy Development Board of India.

The High Pressure Homogenisers are in various capacities ranging from 100 LPH at a pressure of 200-400 bar.

High Pressure Homogenisation is a process of increasing the consistency of a product by means of dispersion.

The homogenising process is advantageous to the product as it increases the viscosity, whiteness, gives smoother texture, improve the stability and absorbent quality, adds richness by better appearance and reduces the reaction time.

The homogenisers incorporate advanced features and match international standards. The after sales prompt service ensures that the production downtime is minimal at the customer's end by providing spares off the shelf. The continuous efforts of R&D make the homogenisers most economical and of better quality.

Salient Features: • High pressure Triplex or Quin Tuplex Plunger Pump, Robust & Rugged in construction • Two Stage Homogenising Head (Manual/Hydraulic Operated) • All contact parts made out of Acid Proof / Corrosion Resistance Stainless Steel • Valve assembly made from imported Stellite material • Plungers made of special hardened steel with superfinished surface • Sanitary Design for CIP Cleaning • Diaphragm type glycerine filled Pressure Guage • Plunger seals consists of single 'V' ring packing made of special food grade material.

For more details, contact:

Goma Engineering Pvt. Ltd.
Behind Universal Petrol Pump
Majiwada, Thane 400 601
Mumbai
Tel: 5346436 / 0875
Fax: 533 3634 / 32
Email: goma@vsnl.com
Website: www.gomaengg.com

CORRUGATED TUBE HEAT EXCHANGE

ECOFLUX corrugated Tube Heat Exchangers have been introduced by Praj Industries of Pune. These are specially designed to meet the hygienic requirements in fruit processing applications like fruit pulps, purees, juices and slices.

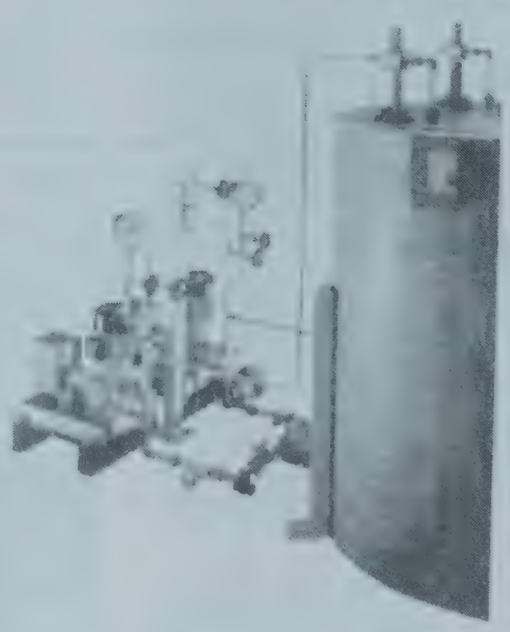
Corrugated patterns on the tubes offer better heat transfer co-efficient and uniform temperature distribution, thereby maintaining the consistency and quality of the end product.

The ECOFLUX Exchangers offer significant advantages over conventional methods i.e. • Compact sizes, saves on space • longer running time, as the turbulent flow reduces fouling • ease of inspection and cleaning ensures lower downtime • low product hold-up • high response to CIP which reduce changes of product contamination • shorter residence time • no moving parts, hence lower energy consumption • double, triple or multi-tube construction for different applications.

For further details, contact:

Praj Industries
Praj House, Bavdhan
Pune - 411 021
Tel: +91 20 5884214 / 5884311
Fax: +91 20 5884218 / 5885215
Email: info@praj.net
Website: www.praj.net

DOSING PUMPS & COMPLETE DOSING SYSTEMS



PreciDose Pumps and Systems offers chemical dosing / metering pumps for various applications for different industries.

"PreciDose" pump is designed specifically for particular application as to see that it gives optimistic performance. L.P. /H.P. dosing pumps for Hydrazine and Tri sodium phosphate, glandless single diaphragm pumps in PTFE or P.P. material of construction for 98 percent H_2SO_4, Comm. HCL, Lime, Sodium Hypo and other hard to handle chemicals. Glandless Double Diaphragm (Sandwich Type) pumps are the most suitable for zero leakage as well as zero contamination of process fluids.

PreciDose pumps are available from few ml/hr to 15000 ltr/hr. and pressure upto 400 kg/cm^2 in different materials of construction.

PreciDose also offers complete dosing systems with valves, tank, agitator, skid etc... with or without automation for chemical, pulp and paper, thermal power plants and many many other industries.

High Pressure Triplex Pumps and High Pressure Hydraulic Testing Systems for Thermal Power Stations, Piping contractors etc... is also available on request.

For more details, contact:

PreciDose Pumps & Systems
9, Deep Akruti, Nr. L.G. Hospital
Maninagar, Ahmedabad - 380 008
Telefax: 079-5830762, 5893868, 5465653, 5835598
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S+S all metal separator 'Rapid Compact' separates all ferrous and non ferrous metals starting from a size of 0.3 mm from free falling material. This avoids costly failures of processing equipments and increases productivity. It is used both for intermediate testing in the process and also for final packed product . Thus, it ensures quality, productivity and safety.

The Rapid compact is suitable in various industries such as food, chemical, pharmaceutical, plastics and textile. The decisive advantages of the Rapid Compact All Metal Separators are: • Extremely low overall height • Proven and reliable function over the years of operation • Automatic self balancing • Permanent self monitoring • Temperature compensation • On-line working • Type of protection: IP 65.

The additional facilities such as antistatic scanning pipe, remote control unit, warning blinker and reset facilities are also available as per customers requirements.

For further details, contact:

Rieco Industries Ltd.
1162/2, Shivajinagar
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A new pump, operating on compressed air (3-10 kg /cm²), has been introduced for the first time in India.

It is suitable for drum emptying, direct transfer to height of upto 15 meters, in-plant-transfer, circulation, dosing, filtration and for repacking of chemicals. It has a capacity of 2 litres per minute.

It is offered in three materials, viz. Teflon, Stainless Steel 316 and in Polypropylene.

It is suitable for corrosive chemicals, inflammables, solvents, petroleum products, oils, pesticides, perfumery chemicals and for all low viscosity, free flowing liquids.

It is portable, self priming, runs dry indefinitely, easy to operate, lightweight (3.5 kg.) and totally maintenance free. It is the ideally suitable for very low capacity applications.

For more details, contact:

Chemineers
127-E/1, J.P. Towers
Tagore Road
Rajkot 360 002
Telefax: 0281-464814
Email: almighty@ad1.vsnl.net.in

MEISSNER CAPSULE FILTERS

Self-contained disposable filter assemblies for critical point-of-use filtration and small batch processing of liquids and gases.

Meissner capsule filters are ready-to-use disposable filter assemblies. They are ideal for use in small batch and critical point-of-use applications, in liquid or gas service. Meissner capsule filters incorporate the full range of Meissner filtration media and removal ratings in compact, reliable assemblies. Each capsule filter assembly consists of a pleated filter element integrally sealed into a rugged polypropylene housing. A completely self-contained unit is formed by a state-of-the-art thermal bonding process, ensuring maximum filter integrity, security and performance. No glues, resins, adhesives, metals or other extraneous materials are used. Meissner capsule filters have high mechanical strength to withstand shocks, back pressurization, multiple sterilizations and rigorous daily use. Four sizes are available, each with a variety of connections for easy, reliable to virtually any filtration system. All Meissner attachment filtration media are available in capsule filters, with surface areas up to 2 ft.²

Design Features: • Full range of Meissner filtration media • Removal ratings from 0.04µm to 70µm • Filtration surface area available from 0.3 ft.² to 2.0 ft.² • Ultraclean - no binders, adhesive, or surfactants • Four sizes to meet flow, batch and throughput requirements • Available connections - hose barb, stepped barb, NPT, sanitary • Vent, drain, sampling ports provided • Minimal holdup volume • Clean room manufactured.

For more details, contact:

Pharmaconcept
203, Malwa
Patanwala Estate
L.B.S. Marg Ghatkopar (W)
Mumbai 400 086
Tel: 5003400, 5006777
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LOW COST PRESSURE TRANSMITTERS

For high pressure measurement (gauge and absolute), ADZ series transmitters, from Haris, offers combined repeatability and hysteresis errors that are typically below 0.25 percent of full scale. Long term minimisation of these errors is maintained after millions of full scale overpressure cycles, making electronic set point virtually drift-free. Use of ceramic sensors and its mounting provides excellent resistance to most liquids and chemicals. Ruggedness, reliability and resistance to corrosion are enhanced by the stainless steel housing. Available in the pressure range of 0-2000 kg/cm². (both gauge and absolute), with an accuracy of ± 0.25 percent and operating temperature range of -40+125°C, ADZ transmitters are best used in variety of applications such as process control, petrochemicals, transmissions, water management, airconditioning and refrigeration, pneumatic and hydraulic controls, etc. Also intrinsically safe models available.

For more details, contact:

Haris Enterprise
223 Shanti Industrial Estate
Sarojini Naidu Road
Mulund (W)
Mumbai 400 080
Tel: 568 3435 / 567 2147 / 567 2204
Fax: +91-22-567 2205
Email: harisent@vsnl.com
URL: http://www.harisenterprise.com

HYDRO TEST PUMP - MOTORISED

PreciDose manufactures high pressure hydro test pump for different applications like Pipe Lines, Boilers, Pressure Vessels, Different Types of Valves, Tubes and Hydraulic Hoses etc.

The capacity can be few Ltrs/Hr. to 30 M3/hr. and discharge pressure from 1kg/cm2 to 500 kg/cm2.

The material of construction may be SS 304, SS 316, C.S., Gun Metal or as per clients requirements.

This pump can be driven by electric motor or engine. Complete hydro test system/test bench for valves/tube/hose manufacturing units can be designed and supplied to meet specific requirements.

PreciDose also offers specially designed high pressure triplex plunger pump for reverse osmosis, cleaning, spraying, jetting and other pressure application.

Dosing/Metering pumps are the other products of the company and have complete range including plunger/Glandless Diaphragm type Metering/Dosing Pump.

For more details, contact:

PreciDose Pumps & Systems
9, Deep Akruti, Nr. L.G. Hospital
Maninagar, Ahmedabad - 380 008
Telefax: 079-5830762, 5893868, 5465653, 5835598
Email: vbs@icenet.net

FILTERS

Kumar Process Consultants & Chemicals Pvt. Ltd. are manufactures of quality filters for the last 20 years. They offer a wide range of filters such as bag filters, stalked ring filter, cartridge filter, activated carbon filters and many more.

The filters supplied by them are used in the entire spectrum of beverage industry for soft drinks, packaged fruit juices, whiskies, beers and brandies. The filters impact ultra fine clarity and right consistency. Their filters are used by all the mineral water manufacturers and mineral water plant suppliers all over India and Nepal to ensure consistent quality which confirms to WHO/BIS standards for potable waters.

Their liquid filters upto 0.1 micron is widely used for chemicals, pharmaceutical, process water, edible oil, serum, electronic fluids etc.

The In-Line Conical filters are used for continuous filtration upto 800 LPA with interchangeable porosites from 100 upto 0.2 microns. Best suitable for product filling and bottling lines, laboratories and research.

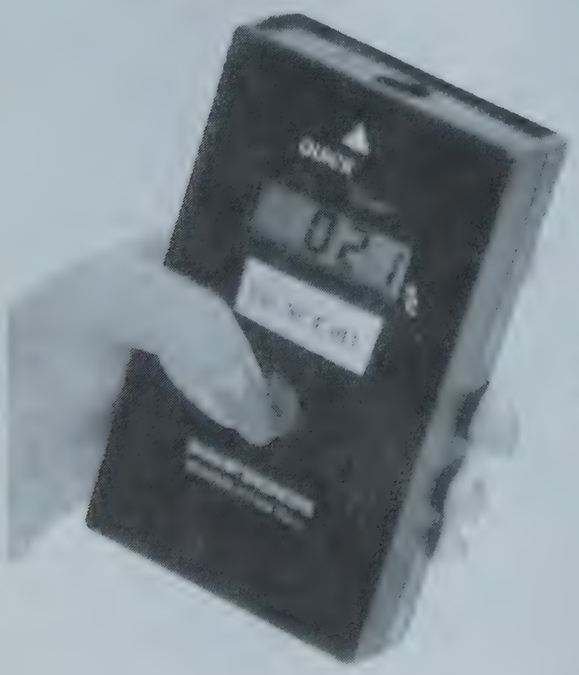
All the filter cartridges and discs are made of chemically compatible materials like Polypropylene, Nylon, PVC, PVDF, PTFE, Glassfibre, Sintered Bronze, Sintered SS, impregnated paper etc.

Filters Housing are fabricated from Stainless Steel Carbon Steel etc. Lining Rubber, FRP, PVDF are also undertaken as per client's requirement.

For more details, contact:

Kumar Process Consultants & Chemicals Pvt. Ltd.
4&5, Bhagtani Enclave
Sonapur Lane
Off. L.B.S. Marg, Bhandup (W)
Mumbai 400078
Tel/Fax: 91-22-5911127/28/29/44, 5654600/5904111
Email: kumarfil@bom3.vsnl.net.in

NON CONTACT DIGITAL THERMOMETER



Dhakar Engineer offers Non Contact Digital Thermometer having range from (-) 18 to 400°C. It is automatic, instant, pocket size, battery operated thermometer that safely and accurately measures temperature using non contact infrared.

DE-NCT is the most techno-economical device and is very useful. You can measure the temperature of any surface whether solid or liquid from distance.

It is very easy to operate NCT. Just point at the desired target, press and hold the "ON" switch for the temperature to be displayed. No contact is necessary.

DE-NCT uses special optical techniques to gather infrared energy from the target surface. The detector converts this energy into electrical signal proportionate to the temperature and the output result is digital temperature in degree C.

For more details, contact:

Dhakar Engineers
Post Box - 196
A-90, Janakpuri, Dhawji Ki Bawdi
Pratap Nagar Main Road
Udaipur 313 02 (RAJ)
Tel: 490211, 490548, 491960
Fax: 0294-490548
Email: dhakareng@hotmail.com
Website: http://www.dhakareng.com

EDIBLE OILS

Kamani Oil Industries leading manufacturers of high quality edible oils and fats cater to the consumer and institutional market as well as bulk segment. The company is equipped with fully integrated plant with modern equipments.

Kamani Oil Industries offers a wide spectrum of oils and fats to suit every customer.

Their R&D with its advanced testing facilities is at the service of the customers for any kinds of trouble shooting issues and can provide cost effective solutions besides new product developments.

Their products find diverse application in areas such as bakery, ice cream, confectionery, catering, snack food, pharmaceuticals as well as health foods.

Their product range includings : • Vegetables oils for cooking • Industrial frying and special culinary applications • Fats for frying, bakery and confectionary products • Tailor made specialities.

For more details, contact:

Kamani Oil Industries
Pooran Asha Bldg.
317, Narsi Natha Street
Mumbai 400009
Tel: 3435967, 3420241/2
Fax: 91-22-3435964
Email: kamani@bom2.vsnl.net.in

VERSATILE G-A DICER

Operating continuously at high production speeds, Urschel®'s versatile Model G-A Dicer cuts uniform dices, straight strips and slices of a wide variety of fruits and vegetables, breads and pasta and meat and cheese products. Interchangeable cutting parts enables the Model G-A Dicer to gently and cleanly cut a range of dice, strip and slice sizes and handle product as diverse soft ripe fruit and brittle root vegetables. Dices, slices and strips can range from 1/8" to 3" long and wise (3.2 to 76.0 mm).

Its simplified design and stainless steel construction results in easy cleanup and maintenance and durability in rugged production environments.

For more details, contact:

Urschel Laboratories Ltd.
2503 Calumet Ave. - P.O. Box 2200
Valparaiso, IN 46384-2200, USA
Tel: 219-4644811
Fax: 219-4623879
Email: info@urschel.com
Website: www.urschel.com

BAGGING MACHINE

Wraptech Machines Pvt. Ltd., offers a fully automatic PLC based Vertical Form-Fill-Seal Machine for powders, free and non-free flowing, granules, pulses, beans, spices, soups, detergents, yeast, desserts, pharmaceutical and agricultural powders, tea, coffee, sugar, rice etc.

A vertical form, fill and seal machine for producing centre sachets handling all types of free flowing / non-free flowing powders / granules.

The above machine handles a single reel film stock. Max. reel dia. is 500 mm on 76 mm core. The machine has the capability to be provided with a variety of filling heads like Volumetric Cup (Telescopic), Auger Filler, Weigh Filler, Count Feeder, Index Conveyor belt. Draw down of the film is through draw down belts controlled through a electromagnetic clutch brake combination. The length of the bag is controlled by print registration system which is PLC based. For unprinted film the bag length can be adjusted from the single touch key pad provided on the front panel.

Special Features: • PLC controlled with XBT membrane keys • AC Inverter drive for main motor speed control • Adjustable draw down belts • Detachable perspex and stainless steel guards, easy for fault finding • Power reel unwind • Can be adapted to seal unsupported films using impulse sealing system • Inbuilt self diagnostic features • PC uplink facility • Password protection for settings • Hourly production data • Overload protection.

Machine packs 50 packs per minute depending on the product type and flow properties.

For more details, contact:

Wraptech Machines Pvt. Ltd.
Dharamchan Industrial Estate
Deonar Village Road
Mumbai 400 088
Tel: 551 2138, 558 3596
Telefax: 91-22-557 0726
Email: abm@wrapmachines.com
Website: www.wrapmachines.com

OZONE GENERATORS

Creative Concept has launched micro-processor based OZ AIR series of Ozone Generators, Ozone Sterilization Systems and Ozone Monitors for Disinfection of Air, Water and Food items. These intelligent Ozonators can decide about "Ozone Dosing" and "Duration of Operation" for achieving total disinfection in a specific area. Ozone Generators and monitors have digital Ozone Concentration Alarm settings, duration of operation etc.

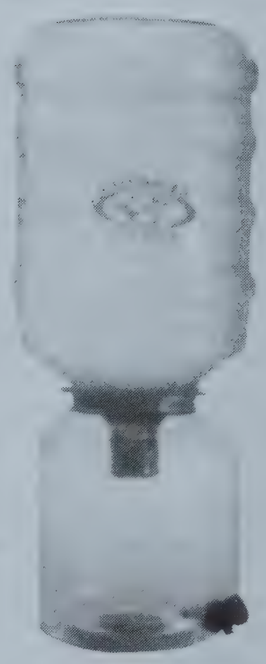
Ozone is the fastest acting oxidizing disinfectant and the most efficient broad-spectrum micro-biological agent commercially available. Being highly reactive and completely non-discriminating it acts immediately. This makes Ozone a very powerful bactericidal agent. Ozone as unlike any other oxidizing agent leaves no toxic residues, thereby being environmentally friendly and helps reduce pollution.

These Ozonators are user friendly, better maintainable State-of-the-art, equipped with a provision of remote control.

For further details, contact:

Creative Concepts
F-62, Sector 8
Noida 201301
Telefax: 011-4552249, 4543337
Email: concept@nda.vsnl.com

WATER DISPENSER



Seagull Mineral Water Pvt. Ltd. is a well known and leading company in the packed pure drinking water segment.

Seagull now presents the new Seagull Water Dispenser with cool cabin. Useful and convenient water cooling machine specially designed, made for offices and homes.

The special peculiarity of the Seagull Water Dispenser is that it serves cold drinking water to quench your thirst with the peaceful satisfaction to your body and soul. This machines also serves hot water for instant tea and coffee.

Specially made cool cabinet of this water dispenser is very ideal for storing canned food, soft drinks, fruits, juices and beverages.

Bottling and sealing is done by fully automatic machines hence not a drop of water is touched by hands.

Seagull's packed pure water is available in water cups of 200ml. Water bottles of 100ml and l litres. Seagull's water jar of 5 litres is also available.

For more details, contact:

Seagull Mineral Water Pvt. Ltd.
Plot A-163, MIDC
Khairne, Navi Mumbai 400 705
Tel: 761 5486 • Fax: 766 6794

CRATES AND CONTAINERS

Prince Multiplast (formerly A-1 Plastics) is one of the largest plastics processors in India. They have developed capabilities in manufacturing Injection Moulded Bottle Crates, Material Handling Crates as well as Blow Moulded Packaging Containers.

Prince Multiplast is an ISO 9001 certified company by Quality Assurance Services, Australia. Some of its customers are Coca Cola, Pepsi and Cadbury for its plastic crates while its blow moulded containers are sold to the likes of Gulf Oil, National Dairy Development Board and Indian Oil Corporation. The company's products are seen virtually in every state of the country.

Continued quality improvement is a way of life at Prince Multiplast from designing development, manufacturing, inspection, testing, production to distribution and customer service. Prince Multiplast has also ensured that product design and manufacturing processes are eco-friendly to avoid wastages.

Prince crates are injection moulded in high grade plastics. Available in a wide range of design and colours, they are odourless and resistant to acids, alkali solutions in common use and are non-toxic. They can be screen printed and embossed with the customer's name and logo and have excellent stability and stacking capacity. These strong and durable crates are used in variety of industries like fisheries, hatcheries, vanaspati, edible oils, ice creams, frozen desserts, soft drinks, beverages, breweries, textiles, automobiles, farms (floriculture, horticulture or an orchard). Bakeries and many more.

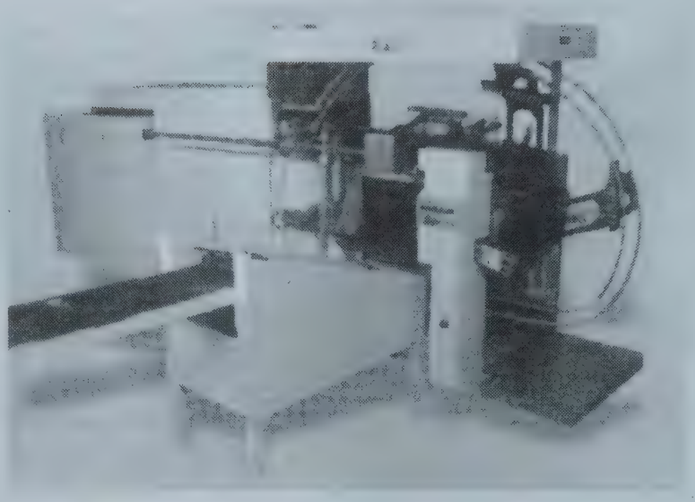
The company produces a wide range of blow moulded articles from 0.5 ltrs. to 30 ltrs., which enables the company to be a one stop shop for its customers who need different sizes of containers. The various functions consisting of product design, development, manufacturing, testing, storing and supply are done under one roof which enhances the co-ordination and quality and hence, better services for valuable customers. The industries which use the company's containers include edible oil, lubricant oil, chemicals, pharmaceuticals and household liquids.

The Computer aided designing centre, with its well equipped Testing Laboratory, modern manufacturing facilities and a team of skilled, dedicated personnel, enables the company to satisfy the customer's needs at all times.

For further details, contact:

Prince Multiplast Pvt. Ltd.
Amar House
Plot No.103, Road No.12
Marol MIDC, Andheri (E)
Mumbai 400 093
Tel: 91-22-8363600/01/02/03/04
Fax: 91-22-8360404/0088
Email: sales@princemultiplast.com
Website: www.princemultiplast.com

BAKING MACHINE



R&D Engineers are India's first & foremost manufacturers of wafer biscuit & ice-cream cone machines. Their years of experience and with the application of latest design and technologies to meet exacting market demand. Their product ranges from small table top machines to fully automatic machines. They also design and supply tailor made solutions to an individual customer need.

R&D Machines are characterized by highest standards in precision, in operating ease, utmost durability and service life.

The "ZE" series of semiautomatic machines are used for baking ice cream cones, sugar cones and cups. These machines are easy to use and are robust. The heating is by electrical heaters designed to optimize energy use and thermal distribution, still flexible for high production on nonstop basis for 24 hours.

The machines manufactured by them are Ice cream Cone baking machine, Batter mixing machine. Automatic Wafer baking machine, Manual Baking Tongs, Rolled Sugar cone machines, Automatic and Semi-Automatic baking machines.

For more details, contact:

R&D Engineers
A-41, IDA Kukatpally
Phase II, Road No. 4
Via I.E. Gandhi Nagar
Hyderabad 500 037
Tel: 3079121, 3079878
Fax: 91-40-3078668
Email: randengg@hd1.vsnl.net.in
Website: www.rndwafers.com

ULTRAVIOLET WATER DISINFECTION SYSTEM

The Ultraviolet Water Disinfection System using the latest US based Teflon® Technology is the ultimate answer to prevent pollution and contamination in water. Non-fouling Teflon® Tubes UV units for water and waste water treatment are used to overcome scale problems. These units find application in disinfection of drinking/process water, pre-treatment before R.O., algae and slime control, purer fermentation products. The system can also be used for various industrial applications such as supply of high purity water for beverage, bottling, brewing, pharmaceuticals, food processing etc. It achieves near cent percent water purity without any side effects. It is also cost effective and maintenance free.

Among the products offered are various models of water disinfection systems, ranging from 225 LPH to 12 Lac LPH of UV systems, micron filters, carbon filters, air irradiators etc.

For further details, contact:

Hitech Ultraviolet Pvt. Ltd.
P.O. Box. No. 8356
35, Grace Plaza
S.V. Road, Jogeshwari (W)
Mumbai 400 102
Tel: 6790610, 6794611, 6794327
Fax: 6794337
Email: hitechuv@bom5.vsnl.net.in

FILLING MACHINES

Apex Electromec Pharma Pvt. Ltd., having industrial machine manufacturing experience of nearly two decades, has made its formidable foray in food and beverage Industry.

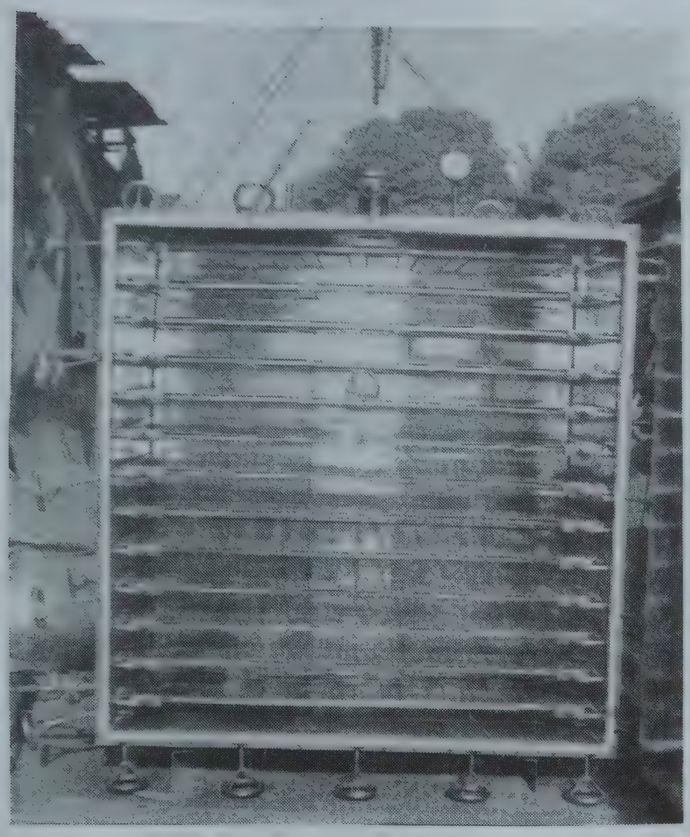
The company manufactures single and multiheaded automatic powder/granule fillers. The accessories it offers for the filling line are swing and slat conveyor, turntable, endless packing conveyor and combicapping multiheaded machine.

Apex Electromec Pharma also offers Infrared Ray Dryers and Material Handling equipments like fixed lifter, mobile stacker, lifters and filter and round IPC.

For more details, contact:

Apex Electromec Pharma Pvt. Ltd.
16, Nitin Indl. Complex
Ghaitan Area, # 1, S.P. Road
Near Vaishali Nagar
Dahisar (E), Mumbai 400 068
Tel: 8964096, Telefax: 8960263
Fax: 8968615
Email: apexppl@hotmail.com
Website: www.apexelectromec.com

VACUUM TRAY DRIER



Magumps, a well-known name in the field of pharmaceutical bulk drug process industries for high quality equipment and plants now introduces the Vacuum Tray Dryer useful for rapid drying of material sensitive to heat and oxidation. This dryer can be used in fine chemicals, food and pharmaceutical industries and are available in standard/GMP/CGMP constructions, with different sizes/capacities i.e. to hold 12 / 24 / 48 trays of 800 x 400 x 50mm size. The Dryers are specially designed so as to withhold full vacuum (700 Hg with only a drop of 75mm/ 24 hrs.) The main chamber of the drier is made out of thick S.S. plate, which are fully welded by argon arc process with heavy duty M.S. stiffeners as well as light and sight glasses are provided from outside. The heating is done with hot water or low pressure steam which is circulated through the shelves fitted inside the dryer. The heating shelves are designed ensuring 100% flat surface for effective heat transfer through thermal conduction with the S.S. Trays. These shelves are hydraulically tested at a pressure of 5kg/cm. sq. The door is swing type on heavy hinges and is fabricated from thicker S.S. plate having nut and bolt with wheel arrangement all across to ensure 100% tightening the chamber ensuring no leakages. The gasket on the door is foodgrade neoprene rubber.

The dryers are provided with a condensor and receiver. The condensor is designed for effective heat transfer area with all contact parts made out of S.S. and the tubes manufactured of seamless pipe. The shell of the condenser is made of MS.

The receiver is manufactured with S.S. contact parts with sight/light glass and is in two parts so that the condensate can be collected effectively during the operation. All the flanges used are of ASA-150 design. The dryer can be supplied complete with S.S. trays, vacuum pump (optional) temperature controller cum indicator (optional).

For further details contact :

Magumps
Trisandhya 'A'
97, D. Phalke Road
Dadar (East)
Mumbai - 400 014.
Tel: 411 3572, 415 4474
Fax: 022-413 7648 / 8307
E-mail: magumps@bom5.vsnl.net.in.

CANNING MACHINES

Cantech Machines established in 1987 by A. P. Pandya, an engineer with over 30 years of experience at Metal Box Co. of India Ltd. is a trusted name for fruit and vegetable canning machineries.

Cantech's can seaming and reforming machines have international standards and are highly suitable for canning fruits and vegetables. The machines have the capacity to manufacture 10-30 cans per minute.

The Can Seaming & Reforming Machine is Semi Automatic Seaming Can with diameter 51 mm to 178 mm and height 51 mm to 248 mm. Output 20-40 cans per minute depending on size. The machines are robust, and easy to handle.

The other machine is CM 510 body beader is suitable for beading flanged can bodies at an output speed of 20 to 25 cans per minute depending on operator's skill and size of container. Diameter Range: 75mm to 175mm, Height Range: upto 250 mm.

Pear pointed gauge is an instrument for determining the vacuum in an open top can for processed food. It can also record pressure developed in the can due to spoilage or hydrogen formation.

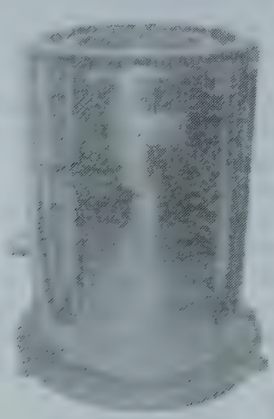
Semi Automatic Seamer with speed of 30-40 cans per minute, Body Reformer, Hand Flanger, Flange Rectifier, Body Beader, Embossing Press, Testing equipment are some of the other machines manufactured.

Cantech seaming machines have also been exported to the Middle East and various African countries. Cantech represents Shin-I Machinery Works Co. Ltd., Taiwan for high speed seamers and Chase Manhattan Inc-Taiwan for easy open ends.

For further details, contact:

Cantech Machines
13, Vora Bhawan
1st Floor, King Circle
Matunga (C.R.)
Mumbai 400 019
Tel: 4096086, 4096853
Telefax: 91-22-4096086

WAFER/SEEDS DRYER MACHINE



Hari Om Industries are manufacturers of various kinds of Food Processing Machine under brand name "Krishna". Apart from processing equipments, Wafer/ Seeds Dryer Machine is exclusively manufactured by latest technology in 3 Phase and 1.5 H.P. and Single Phase. It is easily available in market. Little electricity consumption and more durability.

Main Features: • Motor Rubber Mounting, without Pulley belts, Auto-break system, 18 Gauge S.S. Body Coverage, Strong foundation of Aluminium and cast iron.

Machine Size: 72 cms. X 47 Cms., Jars 33 Cms. x 35 Cms.

Approx Weight: 65 Kg.

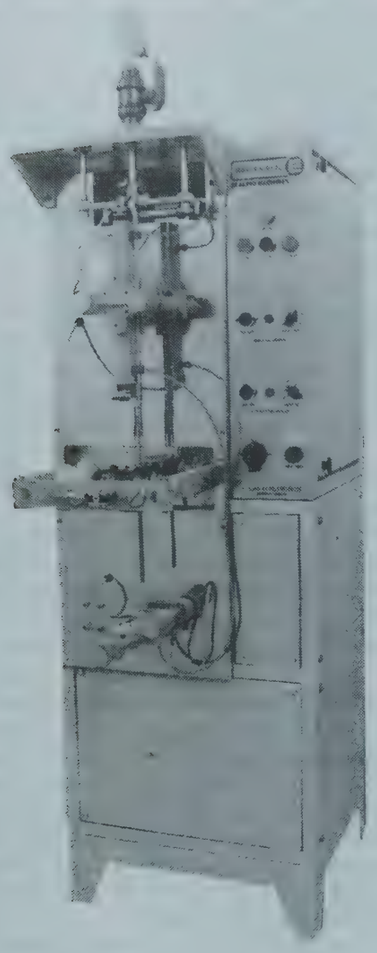
For more details, contact:

Hari Om Industries
Dhebar Road (South)
Atika Ind. Area
Street No.3, Near Jaydev Foundry
Rajkot 360 002
Mobile: 98242 10251
Tel: 363620
Fax: 0281-371745 (R): 371438

When Replying to Advertisements Please Mention

BEVERAGE & FOOD WORLD

JUICE / LIQUID PACKING MACHINE



Lucas Electronics manufactures juice/ liquid packing machines, in particular the Master Seal Liquid Filling LE-F.F.S-200 Series vertical Packaging Machine.

This machine automatically forms a bag, fills it, then seals and separates the finished packets. The LE-F.F.S- 200 is suitable for all kinds of low density liquids like juice, oil, milk, mineral water and any type of free flowing liquids. The Master Seal Vertical form fill and seal machine (F.F.S.) is robust with particular consideration for minimum maintenance, easy to adjust and high reliable output. All contact parts are manufactured by stainless steel. This machine constructed with unique features, is easy to operate for the customers.

Other products manufactured by them are • Liquid/Cream Filling • Shrink Wrapping • Gas Flushing • Continuous Band Sealer • Motorized Pepsi Sealer & Cap Sealer

For further details, contact:

Lucas Electroncis
B2/5, Mapkhan Nagar
Near Fire Brigade, Marol Naka
Andheri (E), Mumbai 400 059
Tel: 8213660 • Fax: 8501265
Telefax: 8254978
Email: lucasg@bom2.vsnl.net.in
Website: www.lucaselectronics.com

LIQUID FILLING MACHINES

H.P. Industries manufacture a range of Special Purpose Machines. Among the Filling machines manufactured by them is the automatic liquid filling machine which is used to fill liquid and pastes. The machine is automatic with high speed extreme accuracy. It accepts any container and is simple to operate. It works independently of human error and fatigue.

H.P. Industries filling machines are Rotary Gravity fillers with high flow rate value and capping heads. They are fully automatic machines designed for filling plastic, glass or metal containers ranging in sizes from 100 ml to 22 litres. The fillers feature stainless steel construction to handle hot or cold liquids and to maintain machine integrity even in repetitive high volume filling.

This machine can give you an output of 25 bottles per minute to 150 bottles per minute. The main advantage of the filling machine is its easy clean-up facility. The machine is most suitable for filling mineral water, milk, juices, oil, cream and other flowable liquids.

The machines not only fills containers but also sorts or carries them to and from the filler. It can be taken on a conveyor to one end of the line and service other features such as rinsing, labelling and coding etc.

Service excellence is more than a matter of pride at HP Industries. It is the central reason behind the development and growth of the company.

For more details, contact:

H.P. Industries
2 Joquim Cottage
Vazir Glass Works Road
J.B. Nagar, Opp. Tata Infotech Ltd.
Andheri (East)
Mumbai - 400 059
Tel: 835 2505, 839 2883
Fax: 091-022-4305504

PROCESS PACKAGING SOLUTION FOR FOOD INDUSTRY

Enriched with rare heritage by their experience, expertise and above all the innovations, PRS Technology Ltd is the fore runner to provide excellent solutions to Processed Foods and Beverages segments to act as catalyst in order to build the Brand equity under the Asian Environments and Climatic Condition.

The Services are : • Projects Selection and Development • Sourcing, Delivering and Commissioning of plant and Machines • Training of Technical Man-Power • Best Back-up After Sales Services

Packaging is an art of design and technology - Mastery in this area by PRS offers variety of machines for Food Industries including thermal processing without the use of inorganic chemicals for long shelf life food. They attach paramount Importance for the dairy, bakery, confectionery segments by providing *"Matching the performance, for reterntion of quality, flavour and colour"* Suitable systems and equipments.

With the imbibed notion of best services, PRS provides unparallel equipments to spices, herbs, nuts etc as well fruits, vegetables, pickles to the manufacturers of the said items.

For the products made out of meat, poultry and fish PRS offers appropriate equipments so that the end products are of superb is taste. Having head quarters in Switzerland, they are having solution centres at New Delhi, Mumbai and Bangalore being handled by hardcore professionals.

For more details, contact:

PRS Technologies Pvt. Ltd.
D-26, Second Floor
South Extension Part II
New Delhi 110049
Tel: 011-6252176, 6252177
Fax: 011-6252178
Email: linto@prs-technologies.com

SPECIALITY INGREDIENTS

The Food and Nutraceutical Div. of S.A. Pharmaceuticals is now very well established and offers Speciality Ingredients to Food Industry. The unique ingredients include whey proteins concentrates import substitute casein, caseinates, natural calcium, prebiotic and bifidus plomelev Inulin and FOS, flour milling enzymes to maintain standard quality of bakery flour, economic substitution of gluten, various polyhydric alcohols, fructose, modified starch and acidulants to improve the quality of food products and help to label the end product as functional food.

For more details, contact:

S. A. PharmaChem Pvt. Ltd.
220, Udyog Bhavan
Sonawala Road
Goregaon (E)
Mumbai 400 063
Tel: 876 4700
Fax: 91-22-876 9532
Email: sac@sachemicals.com
Website: http://www.sachemicals.com

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BUYERS' GUIDE

ACE HYGIENE PRODUCTS PVT. LTD., 222, Shah & Nahar (A2), Lower Parel, Mumbai 13. Tel: 494 5957 / 495 4190, Fax: (022) 495 4250. Email: ho@alfa-india.com, Website: www.alfauv.com
Products: * Water Purifiers

ALOK INTERNATIONAL, 406, Goradia House.100/104 Kazi Sayed Street, P.O. Box 13048, Mumbai 400003. Tel: 342 6390/ 3415668. Fax: 91-22-341 5668
Products: * Gum Algel * Gum Tragacanth * Gum Karaya * Gum Ghatti * Gum Ester * Gum Guar * Gum Arabic/Acacia * Agar Agar * Locust Beand Gum * Gum Carrageenan etc.

APEX ELECTROMEC PHARMA P. LTD., 16, Nitin Indl. Complex, Ghartan Area #1, S.P. Road, Vaishali Nagar, Dahisar (E), Mumbai 400 068. Tel: 8964096 / Telefax: 8960263, Fax: 8968615, Email: apexppl@hotmail.com, Website: www.apexelectromec.com
Products: * Automatic/Semi automatic powder / Granule Fillers * Filling Line Accessories * Infrared Ray Dryers * Material Handling Equipments

AQUA FILSEP INC, 7, Retiwala Industrial Estate, H.A. Palav Marg, Byculla (E), Mumbai- 400027. Tel. (O): 3719455 (R): 4465521, Fax: 91-22-4465521. Ahmedabad: A1/ 1, Chinubhai Towers, Above IOB, Opp. Handloom House, Ashram Road, Ahmedabad 380009. Telefax: 079-6580047/6584069, Email: filsep@ad1.vsnl.net.in, Website: www. aquafilsep.com
Products: * Water & Effluent Treatment Plants * Softners * Demineralisers * Reverse Osmosis Plants * ETP * Chemicals

BOMBAY INDUSTRIAL ENGINEERS, 13, Crystal Apts., Gulmohar Cross Road 11, JVPD, Mumbai 400049. Tel: 91-22-6232810/6201914, Fax: 6201914 Email: ijsehgal @bom5.vsnl.in
Products: * Food Processing Machinery * Hot/Cold Liquid Filling Lines * Bottle Closing Powder Filling, Form-Fill-Sealing Machines * Dryers (Tray, Tunnel, Drum, Fluid Bed) * Biscuit/Bread Making Machinery * Toffee-Hard Boiled Sweet Machinery * Chewing Gum Making Machinery * Ovens * Sigma Kneaders * Mixers

CANTECH MACHINES, 13, Vora Bhuwan, Maheshwari Udyan, Above Dena Bank, Matunga (C.Rly.), Mumbai 400019. Tel: 91-22-4096086, 4096853, Fax: 409 6086, Email: dpandya@bom3.vsnl.net.in
Products: * Complete Fruit & Vegetable Canning Project on Turnkey Basis. Available Imported High Speed Can Seamers both New and Second Hand Machines * OTS Aluminium Two Piece Canline * Liquid Fillers * Metal Box Machines Spares

CHHAYA ENTERPRISES, C-5, Parle Colony, Sahar Road, Vile Parle (E), Mumbai 400057. Tel: (F): 8329259, 8205584
Products: * F& B Processing Machinery e.g. * Colloid Mill * Volumetric Filler * Lobe Pumps * Syringes * Machinery Spare Parts

COSYWO™ ENGINEERING COMPANY, 15 Laxmi Co-op. Indl. Est., Near Nagarvel, Hanuman Mandir, Amraiwadi Rd., Ahmedabad -26. Telefax: 2748164, 2748001, Website: www.cosywo.com
Products: * Stirrers(Lab. & Tank Mounted) * Telescopic Stand with geared agitator * Emulsifier * S.S. Tank * Hollow Shaft Drum Stirrer

CREATIVE CONCEPTS, F-62, Sector 8, Noida 201301, U.P. Telefax: 011-4552249, 4543337, Email: concept@nda. vsnl.net.in / subodhbhatnagar @vsnl.com
Products : Ozone generators for sterilization of Air, Water and Food * Water Treatment Plants * Mineral Water Plants

DHAKAR ENGINEERS, A-90, Janakpuri, Dhawji ki Bawdi, Pratap Nagar Main Road, P.O. Box 196, Udaipur 313 024 (RAJ). Tel: 490211, 491960/61, Fax: 0294-490548
Products: * Electronic Ultrasonic Pest Repeller

GOMA ENGINEERING PVT. LTD., Majiwada, Behind Universal Petrol Pump, Thane 400601. Mumbai. Tel: 91-22-534 6436, 5340875, Fax: 5333634, Email: goma@vsnl.com.
Products: * Turnkey Dairy Projects * Pasteurizers * High Pressure Homogenisers * Sanitary Pumps * Milk Pumps * Storage Tanks * Ghee Boilers * Cream Separators * Clarifiers * Bulk Coolers * Butter Churn * Ice Cream Plants * Milk Tanks * Cheese Line * Butter Line * Other Dairy Equipment

H.P. INDUSTRIES, 2, Joaquim Cottage, Vazir Glass Works Road, J.B. Nagar, Opp. Tata Infotech Ltd., Andheri (E), Mumbai 400059. Tele/ Fax: 8352505, 3392883, Email: hujone@bol.net.in, Website: www.hpmachines. com
Products: Cup Filling & Sealing Machines* Conveyors * Capping Machine * Automatic Monoblock Rinsing, Filling & Capping Machine for Mineral Water * 3 in 1 Monoblock Machine * Two Head Powder Filling Machine * Rotary Vacuum Filling Machine * SPM Machine

HARI OM INDUSTRIES, Dhebar Road (South) Atika Industrial Area, St-3 Near Jaydev Foundry, Rajkot 360002. Tel: 363620 (R) 371438, Fax: 0281-371745, Email: hariomind@epatra.com
Products: Food Processing Machinery

HITECH ULTRAVIOLET PVT. LTD., P.O. Box No. 8356, 35, Grace Plaza, 33, S.V. Road, Jogeshwari (W), Mumbai 400102. Tel: 91-22-6790610, 6794611, 6794327, Fax: 91-22-6794337, Email: hitechuv@bom5.vsnl.net.in
Products: * UV Water Disinfection Systems * Air Purifiers * Filters * Water Treatment Plants * Bottling Plants

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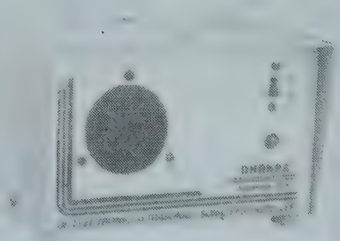

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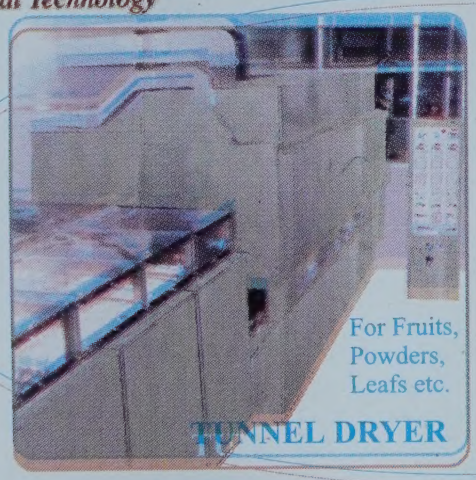

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